

## **Appendix A**

### **Exposure Point Concentrations**

**Table A-1. Summary of selected radionuclide exposure point concentrations.**

Radionuclide	Landfill Design Inventory (Ci/kg)	Evaporation Pond Design Inventory (Ci/L)	Treatment Unit Design Inventory (Ci/kg)	Landfill Waste Acceptance Criteria (Ci/kg)
Hydrogen-3	--	9.06E - 09	--	--
Potassium-40	--	--	1.76E - 08	--
Cobalt-60	1.93E - 07	--	--	1.90E - 04
Strontium-/Yttrium-90	2.29E - 05	--	4.02E - 07	3.50E + 00
Technetium-99	--	5.71E - 10	--	--
Iodine-129	--	6.27E - 10	--	--
Cesium-137	2.44E - 05	--	4.30E - 07	2.30E + 00
Europium-152	9.68E - 07	--	--	9.70E - 04
Europium-155	8.21E - 07	--	--	8.20E - 04
Europium-155	1.76E - 07	--	--	1.80E - 04
Radium-226	--	--	1.56E - 09	--
Uranium-238	--	--	4.18E - 09	--
Plutonium-238	2.33E - 07	--	1.53E - 08	1.00E - 05
Plutonium-239	6.66E - 09	--	--	6.70E - 06
Americium-241	2.38E - 08	--	1.27E - 09	1.00E - 05

-- Indicates that the radionuclide was not selected for the named exposure scenario location.

Table A-2. Summary of organic and inorganic exposure point concentrations.

Constituent	Landfill Design Inventory (mg/kg)	Evaporation Pond Design Inventory (mg/L)	Treatment Unit Design Inventory (mg/kg)	Landfill Waste Acceptance Criteria (mg/kg)
<b>Organic Compounds</b>				
1,1,1-Trichloroethane	1.57E - 02	4.93E - 05	6.35E - 02	1.6E + 01
1,1,2,2-Tetrachloroethane	4.95E - 05	3.05E - 16	--	5.0E - 02
1,1,2-Trichloroethane	2.42E - 04	2.04E - 05	--	2.4E - 01
1,1-Dichloroethane	2.34E - 03	6.84E - 11	--	2.3E + 00
1,1-Dichloroethene	1.48E - 03	2.10E - 11	--	1.5E + 00
1,2,4-Trichlorobenzene	1.14E - 02	7.39E - 08	--	1.1E + 01
1,2-Dichlorobenzene	1.14E - 02	6.46E - 116	--	1.1E + 01
1,2-Dichloroethane	5.38E - 06	6.08E - 11	--	5.4E - 03
1,2-Dichloroethene (total)	3.24E - 04	4.38E - 08	3.13E - 04	3.2E - 01
1,3-Dichlorobenzene	1.14E - 02	7.39E - 08	--	1.1E + 01
1,4-Dichlorobenzene	4.50E - 01	2.92E - 06	--	4.5E + 02
1,4-Dioxane	1.88E - 05	6.79E - 12	--	1.9E - 02
2,4,5-Trichlorophenol	4.46E - 02	3.79E - 06	2.24E - 02	4.5E + 01
2,4,6-Trichlorophenol	1.83E - 02	3.60E - 05	8.87E - 03	1.8E + 01
2,4-Dichlorophenol	2.16E - 02	9.83E - 15	--	2.2E + 01
2,4-Dimethylphenol	1.83E - 02	8.91E - 61	8.87E - 03	1.8E + 01
2,4-Dinitrophenol	5.09E - 02	1.36E - 47	2.24E - 02	5.1E + 01
2,4-Dinitrotoluene	1.14E - 02	3.22E - 08	--	1.1E + 01
2,6-Dinitrotoluene	2.07E - 02	5.85E - 08	1.20E - 02	2.1E + 01
2-Butanone	2.47E - 02	1.19E - 02	5.22E - 05	2.5E + 01
2-Chloronaphthalene	1.14E - 02	2.13E - 12	--	1.1E + 01
2-Chlorophenol	1.83E - 02	1.24E - 181	8.87E - 03	1.8E + 01
2-Hexanone	2.70E - 03	1.30E - 03	--	2.7E + 00
2-Methylnaphthalene	5.12E - 01	5.08E - 02	--	5.1E + 02
2-Methylphenol	2.06E - 02	3.52E - 37	8.87E - 03	2.1E + 01
2-Nitroaniline	2.72E - 02	1.31E - 02	--	1.0E - 01
2-Nitrophenol	1.83E - 02	9.05E - 27	8.87E - 03	1.8E + 01
3,3'-Dichlorobenzidine	1.14E - 02	3.39E - 08	--	1.1E + 01
3-Methyl Butanal	2.23E - 04	1.08E - 04	--	3.3E + 04
3-Nitroaniline	2.72E - 02	1.31E - 02	--	1.0E - 01
4,6-Dinitro-2-methylphenol	4.46E - 02	3.47E - 16	2.24E - 02	4.5E + 01
4-Bromophenyl-phenylether	1.14E - 02	2.56E - 08	--	8.5E + 04
4-Chloro-3-methylphenol	1.83E - 02	1.81E - 03	8.87E - 03	9.6E + 04

Table A-2. (continued).

Constituent	Landfill Design Inventory (mg/kg)	Evaporation Pond Design Inventory (mg/L)	Treatment Unit Design Inventory (mg/kg)	Landfill Waste Acceptance Criteria (mg/kg)
4-Chloroaniline	4.08E - 02	4.05E - 03	--	4.1E + 01
4-Chlorophenyl-phenylether	1.14E - 02	1.13E - 03	--	1.0E + 05
4-Methyl-2-Pentanone	2.96E - 02	5.05E - 37	1.08E - 01	3.0E + 01
4-Methylphenol	3.86E - 02	6.58E - 37	8.87E - 03	3.9E + 01
4-Nitroaniline	2.72E - 02	1.31E - 02	--	1.0E - 01
4-Nitrophenol	5.16E - 02	3.56E - 83	2.24E - 02	5.2E + 01
Acenaphthene	2.02E - 01	3.71E - 13	--	2.0E + 02
Acenaphthylene	2.07E - 02	5.22E - 10	1.20E - 02	2.1E + 01
Acetone	6.20E - 01	4.46E - 113	1.86E - 00	5.0E + 02
Acetonitrile	1.88E - 05	7.71E - 33	--	1.2E + 00
Acrolein	9.06E - 06	1.68E - 37	--	5.5E - 01
Acrylonitrile	9.06E - 06	3.63E - 26	--	5.8E - 01
Anthracene	3.20E - 01	3.85E - 10	--	3.2E + 02
Aramite	1.15E - 04	2.58E - 10	--	6.7E + 00
Aroclor-1016	7.69E - 03	1.96E - 09	9.91E - 03	7.7E + 00
Aroclor-1254	1.28E - 01	3.28E - 08	7.31E - 02	1.3E + 02
Aroclor-1260	7.21E - 01	1.84E - 07	--	5.0E + 02
Aroclor-1268	6.22E - 02	1.59E - 08	3.01E - 02	6.2E + 01
Benzene	6.03E - 01	7.43E - 07	2.58E - 00	5.0E + 02
Benzidine	2.91E - 04	1.38E - 51	--	1.7E + 01
Benzo(a)anthracene	2.53E - 01	3.38E - 15	--	2.5E + 02
Benzo(a)pyrene	1.05E - 01	4.23E - 16	--	1.1E + 02
Benzo(b)fluoranthene	1.79E - 01	5.45E - 15	--	1.8E + 02
Benzo(g,h,i)perylene	1.14E - 02	8.24E - 16	--	1.1E + 01
Benzo(k)fluoranthene	1.86E - 02	1.29E - 14	--	1.9E + 01
Benzoic acid	8.56E - 03	7.51E - 68	--	8.6E + 00
bis(2-Chloroethoxy)methane	1.14E - 02	5.49E - 03	--	1.6E + 02
bis(2-Chloroethyl)ether	1.14E - 02	7.39E - 08	--	1.1E + 01
bis(2-Chloroisopropyl)ether	1.14E - 02	1.90E - 09	--	1.1E + 01
bis(2-Ethylhexyl)phthalate	1.47E - 01	2.31E - 18	9.39E - 05	1.5E + 02
Butane,1,1,3,4-Tetrachloro-	7.89E - 03	4.87E - 14	1.02E - 03	1.0E + 05
Butylbenzylphthalate	6.79E - 02	7.60E - 16	--	6.8E + 01
Carbazole	3.23E - 02	3.21E - 03	9.39E - 05	3.2E + 01
Carbon Disulfide	4.55E - 02	1.99E - 298	1.82E - 02	4.6E + 01

Table A-2. (continued).

Constituent	Landfill Design Inventory (mg/kg)	Evaporation Pond Design Inventory (mg/L)	Treatment Unit Design Inventory (mg/kg)	Landfill Waste Acceptance Criteria (mg/kg)
Chlorobenzene	6.57E - 03	1.28E - 09	--	6.6E + 00
Chloroethane	3.02E - 06	1.81E - 52	--	1.5E - 01
Chloromethane	3.53E - 04	3.50E - 05	--	3.5E - 01
Chrysene	2.65E - 01	2.66E - 14	--	2.7E + 02
Decane, 3,4-Dimethyl	1.61E - 04	7.79E - 05	--	3.3E + 04
Diacetone alcohol	4.32E - 00	7.37E - 35	5.57E - 01	1.0E + 05
Dibenz(a,h)anthracene	1.14E - 02	9.63E - 16	--	1.1E + 01
Dibenzofuran	3.24E - 01	7.96E - 35	--	3.2E + 02
Diethylphthalate	1.14E - 02	1.74E - 13	--	1.1E + 01
Dimethyl Disulfide	2.96E - 03	1.43E - 03	--	3.3E + 04
Dimethylphthalate	1.14E - 02	5.55E - 61	--	1.1E + 01
Di-n-butylphthalate	2.39E - 02	1.23E - 13	7.57E - 04	2.4E + 01
Di-n-octylphthalate	2.62E - 02	2.94E - 19	9.13E - 04	2.6E + 01
Eicosane	2.83E - 03	5.55E - 35	3.65E - 04	1.0E + 05
Ethyl cyanide	1.88E - 05	9.08E - 06	--	3.3E + 04
Ethylbenzene	7.81E - 02	6.86E - 11	--	7.8E + 01
Famphur	5.81E - 05	4.51E - 12	--	1.0E + 05
Fluoranthene	7.62E - 01	5.57E - 10	--	7.6E + 02
Fluorene	1.84E - 01	1.13E - 14	--	1.8E + 02
Heptadecane, 2,6,10,15-Tetra	3.44E - 03	1.66E - 03	4.44E - 04	3.3E + 04
Hexachlorobenzene	1.14E - 02	4.04E - 09	--	1.1E + 01
Hexachlorobutadiene	2.07E - 02	1.66E - 13	1.20E - 03	2.1E + 01
Hexachlorocyclopentadiene	1.14E - 02	7.87E - 16	--	1.1E + 01
Hexachloroethane	1.14E - 02	4.38E - 10	--	1.1E + 01
Indeno(1,2,3-cd)pyrene	1.14E - 02	1.54E - 31	--	1.1E + 01
Isobutyl alcohol	1.88E - 05	2.18E - 105	--	1.2E + 00
Isophorone	1.14E - 02	7.39E - 08	--	1.1E + 01
Isopropyl Alcohol/2-propanol	2.12E - 03	1.53E - 115	--	1.0E + 05
Kepone	9.92E - 02	1.30E - 10	--	9.9E + 01
Mesityl oxide	8.48E - 02	1.44E - 36	1.09E - 02	1.0E + 05
Methyl Acetate	4.84E - 04	2.34E - 04	--	4.8E - 01
Methylene Chloride	8.36E - 02	4.96E - 44	--	2.7E + 01
Naphthalene	4.25E - 01	9.79E - 17	--	4.3E + 02
Nitrobenzene	1.14E - 02	5.17E - 08	--	1.1E + 01

Table A-2. (continued).

Constituent	Landfill Design Inventory (mg/kg)	Evaporation Pond Design Inventory (mg/L)	Treatment Unit Design Inventory (mg/kg)	Landfill Waste Acceptance Criteria (mg/kg)
N-Nitroso-di-n-propylamine	1.14E - 02	6.07E - 08	--	1.1E + 01
N-Nitrosodiphenylamine	1.14E - 02	4.93E - 16	--	1.1E + 01
Octane,2,3,7-Trimethyl	1.61E - 04	7.79E - 05	--	3.3E + 04
o-Toluenesulfonamide	5.06E - 03	2.44E - 03	6.52E - 04	3.3E + 04
Pentachlorophenol	5.59E - 02	7.66E - 06	2.24E - 03	5.6E + 01
Phenanthrene	1.17E - 00	8.97E - 06	--	1.2E + 03
Phenol	7.98E - 02	2.15E - 122	8.87E - 04	8.0E + 01
Phenol,2,6-Bis(1,1-Dimethyl)	4.05E - 03	1.97E - 61	5.22E - 04	1.0E + 05
p-Toluenesulfonamide	5.06E - 03	2.44E - 03	6.52E - 04	3.3E + 04
Pyrene	2.53E - 01	1.43E - 08	--	2.5E + 02
RDX	0.00E + 01	0.00E + 00	--	1.0E + 01
Styrene	1.03E - 06	6.37E - 14	--	6.1E - 02
Tetrachloroethene	9.64E - 03	2.74E - 07	2.49E - 03	9.6E + 00
Toluene	9.82E - 01	8.98E - 33	3.59E - 01	5.0E + 02
Tributylphosphate	3.64E - 01	5.80E - 04	1.28E - 01	4.8E + 02
Trichloroethene	7.20E - 02	1.57E - 06	2.65E - 02	7.2E + 01
Trinitrotoluene	0.00E + 01	0.00E + 00	--	1.1E + 01
Undecane,4,6-Dimethyl-	1.61E - 04	7.79E - 05	--	3.3E + 02
Xylene (ortho)	3.88E - 03	2.04E - 23	1.39E - 03	3.9E + 00
Xylene (total)	3.45E - 00	1.81E - 20	1.01E - 00	5.0E + 02
<b>Inorganic Compounds</b>				
Aluminum	7.08E + 03	5.37E - 03	1.15E + 04	1.6E + 05
Antimony	5.83E - 00	1.31E - 05	5.74E - 02	5.8E + 03
Arsenic	5.65E - 00	5.61E - 01	1.33E + 01	5.8E + 01
Barium	1.79E + 02	4.04E - 04	1.92E + 02	3.0E + 03
Beryllium	2.87E - 01	2.18E - 07	1.06E - 00	1.8E + 01
Boron	1.85E + 02	1.83E + 01	6.10E + 02	3.3E + 03
Cadmium	3.59E - 00	8.07E - 06	1.32E - 00	3.6E + 03
Calcium	2.04E + 04	2.03E + 03	6.30E + 04	No Limit
Chloride	1.87E - 00	9.01E - 01	6.35E - 00	3.3E + 04
Chromium	4.12E + 01	9.26E - 05	3.64E + 01	4.1E + 04
Cobalt	6.04E - 00	1.36E - 05	1.11E + 01	1.1E + 02
Copper	2.99E + 01	6.73E - 05	3.41E + 01	3.0E + 04
Cyanide	3.37E - 01	1.63E - 01	--	3.4E + 02

Table A-2. (continued).

Constituent	Landfill Design Inventory (mg/kg)	Evaporation Pond Design Inventory (mg/L)	Treatment Unit Design Inventory (mg/kg)	Landfill Waste Acceptance Criteria (mg/kg)
Dysprosium	5.93E + 01	4.50E - 05	--	5.9E + 04
Fluoride	3.87E - 00	1.87E + 00	1.24E + 01	3.9E + 03
Iron	1.02E + 04	7.77E - 03	2.28E + 04	2.4E + 05
Lead	5.76E + 01	4.37E - 05	2.28E + 01	5.8E + 04
Magnesium	4.47E + 03	4.44E + 02	8.98E + 03	1.2E + 05
Manganese	2.07E + 02	4.65E - 04	4.14E + 02	4.9E + 03
Mercury	9.45E - 00	7.17E - 06	2.50E - 00	9.5E + 03
Molybdenum	1.02E + 01	1.02E - 04	3.37E + 01	1.0E + 04
Nickel	1.97E + 01	1.49E - 05	4.21E + 01	3.5E + 02
Nitrate	3.93E - 00	1.90E + 00	1.13E + 01	3.9E + 03
Nitrate/Nitrite-N	2.22E - 01	1.07E - 01	--	3.3E + 04
Nitrite	8.49E - 03	4.10E - 03	--	8.5E + 00
Phosphorus	9.74E + 01	9.66E + 00	--	No Limit
Potassium	1.13E + 03	1.13E - 02	1.99E + 03	4.3E + 04
Selenium	8.46E - 01	1.90E - 06	2.17E - 00	8.5E + 02
Silver	9.84E - 00	7.47E - 06	9.86E - 01	9.8E + 03
Sodium	2.11E + 02	1.60E - 04	4.57E + 02	3.2E + 03
Strontium	1.82E + 01	4.10E - 05	--	1.8E + 04
Sulfate	2.05E + 01	9.91E + 00	6.99E + 01	3.3E + 04
Sulfide	7.59E + 02	3.66E + 02	--	3.3E + 04
Terbium	5.73E + 02	4.35E - 04	--	No Limit
Thallium	3.70E - 01	2.81E - 07	8.09E - 03	4.3E + 00
Vanadium	2.12E + 01	2.11E + 00	4.59E + 01	4.5E + 02
Ytterbium	1.95E + 02	1.48E - 04	--	No Limit
Zinc	2.08E + 02	1.58E - 04	1.19E + 02	2.1E + 05
Zirconium	6.91E + 01	3.11E - 10	2.26E + 02	No Limit

## **Appendix B**

### **Exposure Assumptions**

Table B-1. Summary of exposure assumptions.

Parameter	Symbol	Units	Bulldozer Operator <sup>1</sup>	Source	Treatment Operator	Source	Evaporation Pond Operator	Source	ICDF Visitor	Source	INEEL Visitor	Source	CFA & ICDF Office Workers	Source	INEEL Worker	Source
Oral Reference Dose	RfDo	mg/kg-day	chemical specific	a	chemical specific	a	chemical specific	a	chemical specific	a	chemical specific	a	--	--	--	--
Oral Slope Factor	SfO	kg-day/mg	chemical specific	a	chemical specific	a	chemical specific	a	chemical specific	a	chemical specific	a	--	--	--	--
Dermal Reference Dose	RfDd	mg/kg-day	chemical specific	a	chemical specific	a	chemical specific	a	chemical specific	a	chemical specific	a	--	--	--	--
Dermal Slope Factor	SfD	kg-day/mg	chemical specific	a	chemical specific	a	chemical specific	a	chemical specific	a	chemical specific	a	--	--	--	--
Inhalation Reference Dose	RfDi	mg/kg-day	chemical specific	a	chemical specific	a	chemical specific	a	chemical specific	a	chemical specific	a	--	--	--	--
Inhalation Slope factor	SfI	kg-day/mg	chemical specific	a	chemical specific	a	chemical specific	a	chemical specific	a	chemical specific	a	chemical specific	a	chemical specific	a
Body Weight	BW	kg	70	b	70	b	70	b	70	b	70	b	70	b	70	b
Carcinogenic Averaging Time	ATC	yrs	70	b	70	b	70	b	70	b	70	b	70	b	70	b
Noncarcinogenic Averaging Time	ATN	yrs	15	g	15	g	25	b	15	g	15	g	15	g	15	g
Exposure Frequency	EF	day/yr	158	h	200	j	200	k	3	i	200	j	10	m	10	m
Exposure Duration	ED	yrs	15	g	15	g	25	b	15	g	15	g	15	g	15	g
Exposure Time <sup>2</sup>	ET	hr/day	10	h	10	j	2	k	8	i	10	j	8	m	8	m
Incidental Soil Ingestion Rate	IR	mg/kg	100	c	100	c	--	100	c	--	--	--	--	--	--	--
Skin Surface Area	SA	cm <sup>2</sup> /day	3300	d	3300	d	--	3300	d	--	--	--	--	--	--	--
Dermal Absorption Factor	ABSD	unitless	chemical specific	e	chemical specific	e	--	--	chemical specific	e	--	--	--	--	--	--
Dermal Adherence Factor	AF	mg/cm <sup>2</sup>	0.2	d	0.2	d	--	0.2	d	--	--	--	--	--	--	--
Inhalation rate	INH	m <sup>3</sup> /kg	28.8	n	28.8	n	28.8	n	28.8	n	28.8	n	28.8	n	28.8	n
Particulate Emission Factor	PEF	m <sup>3</sup> /kg	5.00E+06	o	5.00E+06	o	5.00E+06	o	5.00E+06	o	5.00E+06	o	5.00E+06	o	5.00E+06	o
Volatilization Factor	VF	m <sup>3</sup> /kg	chemical specific	f	chemical specific	f	chemical specific	f	chemical specific	f	chemical specific	f	2.33E+06	p	2.33E+06	p

Notes:

1. These exposure assumptions were also used for the landfill operator and landfill truck driver exposure scenarios.
2. Exposure time applies only to the inhalation route exposure. Exposure time for ingestion and dermal routes of exposure are 24 hours.

## Sources:

- a. See Table B-2.
- b. Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors, US EPA OSWER Directive No. 9285.6-03, March 25, 1991.
- c. Exposure Factors Handbook Volume 1, EPA/600/P-95/002Fa, August 1997.
- d. Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Risk Assessment) Interim, EPA/540/R/005. September 2001. Assumes receptor is wearing a short-sleeved shirt, long pants, and shoes; therefore, the exposed skin surface is limited to the face, hands, and forearms.
- e. EPA Region IX Preliminary Remediation Goals ([www.epa.gov/region09/waste/stand/prg/index.htm](http://www.epa.gov/region09/waste/stand/prg/index.htm)).
- f. U. S. Environmental Protection Agency. 1996. Superfund Soil Screening Guidance: User's Guide, Second Edition. Office of Solid Waste and Emergency Response Publication 9355.4-35. July 1996.
- g. Professional judgement; exposure frequency is based on 4 days per week for 36 weeks (March through November) and 1 day per week for the remaining 14 weeks (December through February), 10 hours per day.
- h. Professional judgement; assumes receptor will frequent each exposure area (landfill, evaporation pond with two cells, and SSSTF) one day per year for 8 hours.
- i. Professional judgement; assumes receptor will frequent the exposure area 200 days per year (50 weeks per year, 4 days per week, 10 hours per day).
- j. Professional judgement; assumes receptor will frequent the exposure area 200 days per year (50 weeks per year, 4 days per week, 2 hours per day).
- k. Professional judgement; assumes receptor will frequent exposure area 200 days per year (50 weeks per year, 4 days per week, 1 hour per day).
- l. Professional judgement; assumes receptor will frequent the exposure area 10 days per year, 8 hours per day.
- m. Limiting Values of Radionuclides Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion, Federal Guidance Report No. 11, EPA-520/1-88-020, September 1988.
- n. Based on site-specific data in the Idaho National Engineering Laboratory Site Report, Calendar Year 1989, DOE/ID-12082 (89), June 1990.
- o. Calculated value based on dilution factor.

Table B-2. Summary of toxicity factors.

Chemical Name	Weight of Evidence Class	Sfo (mg/kg-day) <sup>-1</sup>	Sfo Source	RfDo (mg/kg-day)	RfDo Source	Sfi (mg/kg-day) <sup>-1</sup>	Sfi Source	RfDi (mg/kg-day)	RfDi Source	ABSGI <sup>(e)</sup>	ABSGI <sup>(m)</sup>	VF <sup>(n)</sup>
1,1,1-Trichloroethane	D	--	--	2.00E-02	e	--	--	2.86E-01	e	--	1	1.08E+04
1,1,2,2-Tetrachloroethane	C	2.00E-01	a	6.00E-02	e	2.03E-01	a	6.00E-02	d	--	1	1.08E+04
1,1,2-Trichloroethane	C	5.70E-02	a	4.00E-03	a	5.60E-02	a	4.00E-03	d	--	1	1.08E+04
1,1-Dichloroethane	C	--	--	1.00E-01	b	--	--	1.43E-01	b	--	1	1.08E+04
1,1-Dichloroethene	C	6.00E-01	a	9.00E-03	a	1.75E-01	a	9.00E-03	d	--	1	1.08E+04
1,2,4-Trichlorobenzene	D	--	--	1.00E-02	a	--	--	5.70E-02	b	--	1	1.35E+04
1,2-Dichlorobenzene	D	--	--	9.00E-02	a	--	--	5.71E-02	b	--	1	1.08E+04
B2	9.10E-02	a	3.00E-02	e	9.10E-02	a	1.40E-03	e	--	1	1.08E+04	
1,2-Dichloroethene (total)	--	--	--	1.00E-02	b	--	--	1.00E-02	d	--	1	1.08E+04
1,3-Dichlorobenzene	D	--	--	9.00E-04	e	--	--	9.00E-04	d	--	1	1.08E+04
1,4-Dichlorobenzene	C	2.40E-02	b	3.00E-02	e	2.20E-02	e	2.29E-01	a	--	1	1.08E+04
1,4-Dioxane	B2	1.10E-02	a	--	d	1.10E-02	d	--	0.1	1	--	--
2,4,5-Trichlorophenol	--	--	--	1.00E-01	a	--	--	1.00E-01	d	0.1	1	--
2,4,6-Trichlorophenol	B2	1.10E-02	a	--	1.09E-02	a	--	--	3.00E-03	d	0.1	1
2,4-Dichlorophenol	--	--	--	3.00E-03	a	--	--	2.00E-02	d	0.1	1	--
2,4-Dimethylphenol	--	--	--	2.00E-02	a	--	--	2.00E-03	d	0.1	1	--
2,4-Dinitrophenol	--	--	--	2.00E-03	a	--	--	2.00E-03	d	0.1	1	--
2,4-Dinitrotoluene	B2	--	--	2.00E-03	a	--	--	1.00E-03	d	0.1	1	--
2,6-Dinitrotoluene	B2	--	--	1.00E-03	b	--	--	1.00E-03	d	0.1	1	--
2-Butanone	D	--	--	6.00E-01	a	--	--	2.86E-01	a	--	1	1.44E+04
2-Chloronaphthalene	--	--	--	8.00E-02	a	--	--	8.00E-02	d	--	1	2.59E+04
2-Chlorophenol	--	--	--	5.00E-03	a	--	--	5.00E-03	d	--	1	1.08E+04
2-Hexanone	--	--	--	4.00E-02	c	--	--	1.40E-03	c	--	1	--
2-Methylnaphthalene	--	--	--	2.00E-02	c	--	--	--	--	1	6.05E+04	--
2-Methylphenol	C	--	--	5.00E-02	a	--	--	5.00E-02	d	0.1	1	--
2-Nitroaniline	--	--	--	5.71E-05	d	--	--	5.71E-05	b	0.1	1	1.08E+04
2-Nitrophenol	--	--	--	8.00E-03	g	--	--	8.00E-03	g	0.1	1	--
3,3'-Dichlorobenzidine	B2	4.50E-01	a	--	--	4.50E-01	d	--	--	1	1.08E+04	--
3-Methyl Butanal*	--	--	--	5.71E-05	h	--	--	5.71E-05	h	0.1	1	--
3-Nitroaniline	--	--	--	2.00E-03	1	--	--	2.00E-03	1	0.1	1	--
4,6-Dinitro-2-methylphenol	--	--	--	5.71E-05	h	--	--	--	--	1	1.08E+04	--
4-Bromophenyl-phenylether*	--	--	--	--	--	--	--	--	--	1	1.08E+04	--
4-Chloro-3-methylphenol*	--	--	--	4.00E-03	a	--	--	4.00E-03	d	0.1	1	--
4-Chloroaniline	--	--	--	--	--	--	--	--	--	1	1.08E+04	--
4-Chlorophenyl-phenylether*	--	--	--	--	--	--	--	--	--	1	1.08E+04	--
4-Methyl-2-Pentanone	C	--	--	8.00E-02	b	--	--	2.29E-02	b	--	1	1.08E+04
4-Methylphenol	C	--	--	5.00E-03	b	--	--	5.00E-03	d	0.1	1	--
4-Nitroaniline	D	--	--	5.71E-05	i	--	--	5.71E-05	i	0.1	1	--
4-Nitrophenol	D	--	--	8.00E-03	e	--	--	8.00E-03	d	0.1	1	5.78E+04
Acetaphthene	--	--	--	6.00E-02	a	--	--	6.00E-02	d	--	1	1.47E+04
Aceraphthylene	D	--	--	6.00E-02	j	--	--	6.00E-02	j	--	1	4.28E+04
Acetone	D	--	--	1.00E-01	a	--	--	1.00E-01	d	--	1	1.08E+04
Acetonitrile	--	--	--	6.00E-03	a	--	--	1.70E-02	a	--	1	1.47E+04
Acrolein	C	--	--	2.00E-02	b	--	--	5.71E-06	a	--	1	1.08E+04
Acrylonitrile	B1	5.40E-01	a	1.00E-03	b	--	--	5.71E-04	a	--	1	1.08E+04
Anthracene	D	--	--	3.00E-01	a	--	--	3.00E-01	d	--	1	2.20E+05
Aramite	B2	2.50E-02	a	5.00E-02	b	--	--	5.00E-02	d	0.1	1	--
Aroclor-1016	B2	7.00E-02	a	7.00E-05	a	--	--	7.00E-05	a	0.14	1	--

Table B-2. Summary of toxicity factors.

Chemical Name	Weight of Evidence Class	Sf <sub>o</sub> (mg/kg-day) <sup>-1</sup>	Sf <sub>o</sub> Source	RfDo (mg/kg-day)	RfDo Source	Sf <sub>i</sub> (mg/kg-day) <sup>-1</sup>	Sf <sub>i</sub> Source	RfDi (mg/kg-day)	RfDi Source	ABSGI <sup>(m)</sup>	VF <sup>(n)</sup>
Aroclor-1254	B2	2.00E+00	a	2.00E-05	a	2.00E+00	a	2.00E-05	d	0.14	1
Aroclor-1260	--	2.00E+00	a	--	2.00E+00	a	--	--	0.14	1	--
Aroclor-1268	--	2.00E+00	a	--	2.00E+00	a	--	--	0.14	1	--
Benzene	A	5.50E-02	a	3.00E-03	e	2.70E-02	a	1.71E-03	c	--	1.08E+04
Benzidine	A	2.30E+02	a	3.00E-03	a	2.30E+02	a	3.00E-03	d	0.1	1
Benzo(a)anthracene	B2	7.30E-01	e	--	3.10E-01	e	--	--	0.13	1	--
Benzo(a)pyrene	B2	7.30E+00	a	--	3.10E+00	e	--	--	0.13	1	--
Benzo(b)fluoranthene	B2	7.30E-01	e	--	3.10E-01	e	--	--	0.13	1	--
Benzo(g,h,i)perylene	D	--	3.00E-02	k	--	3.00E-02	k	--	1	--	--
Benzo(k)fluoranthene	B2	7.30E-02	e	--	3.10E-02	e	--	--	0.13	1	--
Benzoic acid	D	--	4.00E+00	a	--	--	--	--	0.1	1	--
bis(2-Chloroethoxy)methane*	--	--	--	--	--	--	--	--	1	1	--
bis(2-Chloroethyl)ether	B2	1.10E+00	a	--	1.16E+00	a	--	--	1	1	2.55E+04
bis(2-Chloroisopropyl)ether	C	7.00E-02	b	4.00E-02	a	3.50E-02	b	4.00E-02	d	--	1.08E+04
bis(2-Ethylhexyl)phthalate*	B2	1.40E-02	a	2.00E-02	a	1.40E-02	e	2.20E-02	d	0.1	1
Butane,1,1,3,4-Tetrachloro-Butylbenzylphthalate	C	--	--	--	--	--	--	--	1	1	--
Carbazole	B2	2.00E-02	b	--	2.00E-01	a	--	2.00E-01	d	0.1	--
Carbon Disulfide	--	--	--	1.00E-01	a	--	2.00E-01	a	--	1	1.08E+04
Chlorobenzene	D	--	--	2.00E-02	a	--	--	1.70E-02	c	--	1.08E+04
Chloroethane	--	2.90E-03	e	4.00E-01	e	2.90E-03	e	2.86E+00	a	--	1.08E+04
Chloromethane	C	1.30E-02	b	--	6.30E-03	b	8.66E-02	e	--	1	1.08E+04
Chrysene	B2	7.30E-03	e	--	3.10E-03	e	--	--	0.13	1	--
Decane, 3,4-Dimethyl*	--	--	--	--	--	--	--	--	1	1	--
Diacetone alcohol*	--	--	--	--	--	--	--	--	1	1	--
Dibenz(a,h)anthracene	B2	7.30E+00	e	--	3.10E+00	e	--	--	0.13	1	2.07E+05
Dibenzofuran	D	--	4.00E-03	c	--	4.00E-03	d	--	1	1	--
Diethylphthalate	D	--	8.00E-01	a	--	8.00E-01	d	0.1	1	--	--
Dimethyl Disulfide*	--	--	--	--	--	--	--	--	1	1	--
Dimethylphthalate	D	--	1.00E+01	a	--	1.00E+01	d	0.1	1	--	--
Di-n-butylphthalate	D	--	1.00E-01	a	--	1.00E-01	d	0.1	1	--	--
Di-n-octylphthalate	--	--	2.00E-02	b	--	2.00E-02	d	0.1	1	--	--
Eicosane*	--	--	--	--	--	--	--	--	1	1	--
Ethyl cyanide*	D	--	1.00E-01	a	--	2.90E-01	a	--	1	1	1.08E+04
Ethylbenzene	D	--	1.00E-01	a	--	4.00E-02	d	--	1	1	--
Famphur*	--	--	--	--	--	--	--	--	1	1	--
Fluoranthene	D	--	4.00E-02	a	--	4.00E-02	d	0.13	1	--	--
Hepadecane, 2,6,10,15-Tetra*	B2	1.60E+00	a	8.00E-04	a	1.61E+00	a	8.00E-04	d	0.1	--
Hexachlorobenzene	C	7.80E-02	a	3.00E-04	e	7.80E-02	a	3.00E-04	d	0.1	--
Hexachlorobutadiene	D	--	7.00E-03	a	--	--	--	2.00E-05	b	0.1	--
Hexachlorocyclopentadiene	C	1.40E-02	a	1.00E-03	a	1.40E-02	a	1.00E-03	d	0.1	--
Hexachloroethane	B2	7.30E-01	e	--	3.10E-01	e	--	--	0.13	1	--
Indeno(1,2,3-cd)pyrene	--	--	3.00E-01	a	--	3.00E-01	d	--	1	1	--
Isobutyl alcohol	C	9.50E-04	a	2.00E-01	a	9.50E-04	e	2.00E-01	d	0.1	--
Isophorone	--	--	--	--	--	--	--	--	1	1	--
Isopropyl Alcohol/2-propano <sup>l</sup> *	--	1.80E+01	e	--	--	1.80E+01	d	--	0.1	1	--
Kepone											

Table B-2. Summary of toxicity factors.

Chemical Name	Evidence Class	Weight of Evidence Class (mg/kg-day) <sup>-1</sup>	Sfo Source	RfDo (mg/kg-day)	RfDo Source	Sfi (mg/kg-day) <sup>-1</sup>	Sfi Source	RfDi (mg/kg-day)	RfDi Source	ABS <sub>d</sub> <sup>(c)</sup>	ABSGI <sup>(m)</sup>	VF <sup>(n)</sup>
Mesityl oxide*	--	--	--	--	--	--	--	--	--	1	--	1
Methyl Acetate	--	--	--	1.00E+00	b	--	--	1.00E+00	d	--	1.53E+04	1
Methylene Chloride	B2	7.50E-03	a	6.00E-02	a	1.65E-03	a	8.57E-01	b	--	1.08E+04	1
Naphthalene	C	--	--	2.00E-02	a	--	--	8.57E-04	a	--	1.41E+04	1
Nitrobenzene	B2	--	--	5.00E-04	a	--	--	5.71E-04	b	--	2.05E+04	1
N-Nitroso-di-n-propylamine	B2	7.00E+00	a	--	--	7.00E+00	d	--	--	0.1	1	--
N-Nitrosodiphenylamine	B2	4.90E-03	a	--	--	4.90E-03	d	--	--	0.1	1	--
Octane,2,3,7-Trimethyl*	--	--	--	--	--	--	--	--	--	1	--	--
o-Toluenesulfonamide*	--	--	--	--	--	--	--	--	--	1	--	--
Pentachlorophenol	B2	1.20E-01	a	3.00E-02	a	1.20E-01	d	3.00E-02	d	0.25	1	--
Phenanthrene	D	--	--	3.00E-01	p	--	--	3.00E-01	d	--	1	--
Phenol	D	--	--	6.00E-01	a	--	--	6.00E-01	d	0.1	1	--
Phenol,2,6-Bis(1,1-Dimethyl)*	--	--	--	--	--	--	--	--	--	1	--	--
p-Toluenesulfonamide*	--	--	--	--	--	--	--	--	--	1	--	--
Pyrene	D	--	--	3.00E-02	a	--	--	3.00E-02	d	--	1	--
Styrene	C	--	--	2.00E-01	a	--	--	2.90E-01	a	--	1.08E+04	1
Tetrachloroethene	C-B2	5.20E-02	e	1.00E-02	a	2.03E-03	e	1.14E-01	e	--	1.08E+04	1
Toluene	D	--	--	2.00E-01	a	--	--	1.10E-01	b	--	1.08E+04	1
Tritylphosphate*	--	--	--	--	--	--	--	--	--	1	--	--
Trichloroethene	B2	1.10E-02	e	6.00E-03	a	6.00E-03	e	6.00E-03	d	--	1.08E+04	1
Undecane,4,6-Dimethyl-*	--	--	--	--	--	--	--	--	--	1	--	--
Xylene (ortho)	--	--	--	2.00E+00	a	--	--	2.00E-01	a	--	1.08E+04	1
Xylene (total)	D	--	--	2.00E+00	a	--	--	2.00E-01	a	--	1.08E+04	1
Trinitrotoluene	--	3.00E-02	a	5.00E-04	a	3.00E-02	d	5.00E-04	d	0.1	1	--
RDX	--	1.10E-01	a	3.00E-03	a	1.10E-01	d	3.00E-03	d	0.1	1	--
Aluminum	--	--	--	1.00E+00	e	--	--	1.40E-03	e	--	1	--
Antimony	D	--	--	4.00E-04	a	--	--	--	--	0.15	1	--
Arsenic	A	1.50E+00	a	3.00E-04	a	1.51E+01	a	--	--	0.03	1	--
Barium	D	--	--	7.00E-02	a	--	--	1.43E-04	b	--	0.07	--
Beryllium	B1	--	--	2.00E-03	a	8.40E+00	a	5.71E-06	a	--	0.007	--
Boron	D	--	--	9.00E-02	a	6.30E+00	a	5.71E-03	b	--	0.001	0.025
Cadmium	B1	--	--	5.00E-04	a	--	--	--	--	1	--	--
Calcium*	--	--	--	--	--	--	--	--	--	1	--	--
Chloride*	--	--	--	--	--	--	--	--	--	1	--	--
Chromium	A	--	--	--	--	4.20E+01	a	--	--	0.025	--	--
Cobalt	--	--	--	6.00E-02	e	--	--	--	--	1	--	--
Copper	D	--	--	3.71E-02	b	--	--	8.57E-04	a	--	1	--
Cyanide	--	--	--	2.00E-02	a	--	--	--	--	1	--	--
Dysprosium	--	--	--	2.00E-01	e	--	--	--	--	1	--	--
Fluoride	--	--	--	6.00E-02	a	--	--	--	--	1	--	--
Iron	--	--	--	3.00E-01	e	--	--	--	--	1	--	--
Lead*	--	--	--	--	--	--	--	--	--	1	--	--
Magnesium*	--	--	--	--	--	--	--	--	--	1	--	--
Manganese	D	--	--	2.40E-02	a	--	--	1.40E-05	a	--	0.04	--
Mercury	D	--	--	3.00E-04	a	--	--	--	--	0.07	--	--
Molybdenum	--	--	--	5.00E-03	b	--	--	--	--	1	--	--
Nickel	D	--	--	2.00E-02	a	--	--	--	--	0.04	--	--
Nitrate*	--	--	--	--	--	--	--	--	--	1	--	--

Table B-2. Summary of toxicity factors.

Chemical Name	Weight of Evidence Class	Sfo (mg/kg-day) <sup>-1</sup>	Sfo Source	RfDo (mg/kg-day)	RfDo Source	Sfi (mg/kg-day) <sup>-1</sup>	Sfi Source	RfDi (mg/kg-day)	RfDi Source	ABSGI <sup>(m)</sup>	ABSGI <sup>(n)</sup>	VF <sup>(o)</sup>
Nitrate/Nitrite-N*	--	--	--	--	--	--	--	--	--	--	--	--
Nitrite*	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus*	--	--	--	--	--	--	--	--	--	--	--	--
Potassium*	--	--	--	--	--	--	--	--	--	--	--	--
Selenium	D	--	--	5.00E-03	a	--	--	--	--	--	--	--
Silver	D	--	--	5.00E-03	a	--	--	--	--	--	--	0.04
Sodium*	--	--	--	--	--	--	--	--	--	--	--	--
Strontium	--	--	--	6.00E-01	a	--	--	--	--	--	--	--
Sulfate*	--	--	--	--	--	--	--	--	--	--	--	--
Sulfide*	--	--	--	--	--	--	--	--	--	--	--	--
Terbium*	--	--	--	--	--	--	--	--	--	--	--	--
Thallium	D	--	--	6.60E-05	a	--	--	--	--	--	--	--
Vanadium	--	--	--	7.00E-03	b	--	--	--	--	--	--	0.026
Ytterbium*	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	D	--	--	3.00E-01	a	--	--	--	--	--	--	--
Zirconium*	--	--	--	--	--	--	--	--	--	--	--	--

## Sources:

- a. U.S. EPA. The Integrated Risk Information System (EPA 2002), a database available through the EPA National Center for Environmental Assessment (NCEA). <http://www.epa.gov/iris/>.
- b. U.S. EPA. Health Effects Assessment Summary Tables (HEAST) FY 1997 Update. EPA-540-R-97-036. July 1997.
- c. U.S. EPA Region III RBC Tables. April 1999. <http://www.epa/reg3hwmd/risk/>.
- d. Route to route extrapolation.
- e. U.S. EPA Region IX Preliminary Remediation Goals Table. November 22, 2000. [http://www.epa.gov/region09/waste/sfund/prg/s1\\_01.htm](http://www.epa.gov/region09/waste/sfund/prg/s1_01.htm).
- f. Oak Ridge National Laboratory. October 2001. [http://risk.lsd.ornl.gov/rap\\_hp.html](http://risk.lsd.ornl.gov/rap_hp.html).
- g. Toxicity factors for 4-nitrophenol were used as surrogates for 2-nitrophenol.
- h. Toxicity factors for 2-nitroaniline were used as surrogates for 3-nitroaniline.
- i. Toxicity factors for 2-nitroaniline were used as surrogates for 4-nitroaniline.
- j. Toxicity factors for acenaphthene were used as surrogates for acenaphthylene.
- k. Toxicity factors for pyrene were used as surrogates for benzo(g,h,i)perylene.
- l. Toxicity factors for 2,4-dinitrophenol were used as surrogates for 4,6-dinitro-2-methylphenol.
- m. U.S. EPA Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Interim. September 2001.
- n. U. S. Environmental Protection Agency. 1996. Superfund Soil Screening Guidance: User's Guide, Second Edition. Office of Solid Waste and Emergency Response Publication 9355.4-35. July 1996.
- p. Toxicity factors for anthracene were used as surrogates for phenanthrene.
- \* No toxicity factors available for this chemical.
- = not applicable or not available.



**Table B-3. Revised volatilization factor model.**

Sources: EPA Soil Screening Guidance (EPA/540/R-96/018) and EPA Region IX Preliminary Remediation Goals, October 2000.

Model:

$$VF_s = (Q/C) \times \frac{(3.14 \times D_A \times T)^{1/2}}{(2 \times p_b \times D_A)} \times 10^{-4} \text{ m}^2 / \text{cm}^2$$

Where:

$$D_A = \frac{[(P_a^{10^3} D_i H + P_w^{10^3} D_w)/n^2]}{p_b + P_w + P_a H}$$

Symbol	Description	Value (source: Region IX PRGs)
VF <sub>s</sub> D_A	Volatile Factor (m <sup>3</sup> /kg) Apparent diffusivity (cm <sup>2</sup> /s) Inverse of mean concentration at the center of a 0.5-acre, square source (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	calculated calculated
Q/C T	Exposure time (s)	68.81 7.88E+08 25 years
p_b	Dry soil bulk density (g/cm <sup>3</sup> )	1.5
P_a n	Air-filled soil porosity (L_air/L_soil) Total soil porosity (L_pore/L_soil)	0.26 0.38
P_w p_s	Water-filled soil porosity (L_water/L_soil)	0.38
D_i	Soil particle density (g/cm <sup>3</sup> )	0.12
H	Diffusivity in air (cm <sup>2</sup> /s) Henry's Law constant (atm-m <sup>3</sup> /mole)	2.65 chem-specific chem-specific
H' D_w	Dimensionless Henry's Law constant (H x 41) Diffusivity in water (cm <sup>2</sup> /s)	chem-specific chem-specific
K_d	Soil-water partition coefficient (cm <sup>3</sup> /g) = K_oc x f_oc	chem-specific
K_oc f_oc	Soil organic carbon partition coefficient (cm <sup>3</sup> /g) Fraction of organic carbon in soil (g/g)	chem-specific chem-specific
		0.00071 1.08E+04
<b>Mass Limit Volatilization Factor (m<sup>3</sup>/kg)</b>		

**Table B-3. Revised volatilization factor model.**  
**Chemical-specific values and results.**

Chemical	Dimensionless Henry's Law Constant	Soil organic carbon partition coefficient (cm <sup>3</sup> /g)	Diffusivity in Air (cm <sup>2</sup> /s)	Diffusivity in Water (cm <sup>2</sup> /s)	Soil-water partition coefficient (K <sub>w</sub> )	Apparent Diffusivity (D <sub>A</sub> )	Volatilization Factor (m <sup>3</sup> /kg)	Higher than mass-limit VF?	Selected VF
1,1,1-Trichloroethane	0.7052	0.078	8.80E-06	0.10	9.56E-03	1.17E-03	yes	1.08E+04	
1,1,2,2-Tetrachloroethane	0.01445	79	0.071	7.90E-06	0.06	3.76E-04	5.89E-03	yes	1.08E+04
1,1,2-Trichloroethane	0.037433	75	0.078	8.80E-06	0.05	1.08E-03	3.47E-03	yes	1.08E+04
1,1-Dichloroethane	0.23042	53	0.0742	1.05E-05	0.04	5.62E-03	1.52E+03	yes	1.08E+04
1,1-Dichloroethylene	1.0701	65	0.09	1.04E-05	0.05	1.60E-02	9.02E+02	yes	1.08E+04
1,2,4-Trichlorobenzene	0.05822	1659	0.03	8.23E-06	1.18	7.14E-05	1.35E-04	no	1.35E+04
1,2-Dichlorobenzene	0.0779	379	0.069	7.90E-06	0.27	7.68E-04	4.12E+03	yes	1.08E+04
1,2-Dichloroethane	0.040139	38	0.104	9.90E-06	0.03	1.90E-03	2.62E+03	yes	1.08E+04
1,2-Dichloroethene (total)	0.16728	35.5	0.0736	1.13E-05	0.03	4.75E-03	1.66E+03	yes	1.08E+04
1,3-Dichlorobenzene	0.0779	379	0.069	7.90E-06	0.27	7.68E-04	4.12E+03	yes	1.08E+04
1,4-Dichlorobenzene	0.09963	616	0.069	7.90E-06	0.44	6.66E-04	4.42E+03	yes	1.08E+04
2-Chloronaphthalene	0.01271	1550	0.0347	8.80E-06	1.10	1.93E-05	2.59E+04	no	2.59E+04
2-Chlorophenol	0.016031	398	0.501	9.48E-06	0.28	1.14E-03	3.38E+03	yes	1.08E+04
2-methylnaphthalene	0.002378	2241.8882	0.048	7.84E-06	1.59	3.55E-06	6.05E+04	no	6.05E+04
2-Nitroaniline	0.00930701	16.98	0.0473	8.58E-06	0.01	2.44E-04	7.31E+03	yes	1.08E+04
3-Nitroaniline	0.00930701	16.98	0.0473	8.58E-06	0.01	2.44E-04	7.31E+03	yes	1.08E+04
4-Nitroaniline	0.00930701	16.98	0.0473	8.58E-06	0.01	2.44E-04	7.31E+03	yes	1.08E+04
Acenaphthene	0.006355	4898	0.0421	7.68E-06	3.48	3.90E-06	5.78E+04	no	5.78E+04
Acenaphthylene	0.0044674	2001.8568	0.0439	7.53E-06	1.42	7.09E-06	4.28E+04	no	4.28E+04
Acetone	0.0015908	0.575	0.124	1.14E-05	0.00	1.27E-04	1.01E+04	yes	1.08E+04
Acetonitrile	0.00082	15.6	0.128	1.70E-05	0.01	6.03E-05	1.47E+04	no	1.08E+04
Acrolein	0.000492	21.2	0.105	1.22E-05	0.02	2.79E-04	6.82E+03	yes	1.08E+04
Acrylonitrile	0.0036244	0.85	0.1084	1.34E-05	0.00	2.51E-04	7.20E+03	yes	1.08E+04
Anthracene	0.002665	23500	0.0324	7.74E-06	16.69	2.69E-07	2.20E+05	no	2.20E+05
Benzene	0.22755	62	0.088	9.80E-06	0.04	6.34E-03	1.43E+03	yes	1.08E+04
Bis(2-chloroethyl)ether	0.000738	76	0.0692	7.53E-06	0.05	1.99E-05	2.55E+04	no	2.55E+04
Bis(2-chloroisopropyl)ether	0.004633	61	0.06308	6.40E-06	0.04	1.22E-04	1.03E+04	yes	1.08E+04
Carbon disulfide	1.2423	45.7	0.0104	1.00E-05	0.03	2.04E-02	7.99E+02	yes	1.08E+04
Chlorobenzene	0.1517	224	0.073	8.70E-06	0.16	2.16E-03	2.45E+03	yes	1.08E+04
Chloroethane	0.451	14.7	0.1041	1.15E-05	0.01	1.44E-02	9.50E+02	yes	1.08E+04
Chloromethane	0.984	35	0.1088935	6.50E-06	0.02	2.01E-02	8.04E+02	yes	1.08E+04
Dibenzo-furan	0.000533	7760	0.0601	1.00E-05	5.51	3.04E-07	2.07E+05	no	2.07E+05
Ethylbenzene	0.32308	204	0.075	7.80E-06	0.14	4.47E-03	1.71E+03	yes	1.08E+04
Methyl acetate	0.0008446	2.2	0.10315	1.00E-05	0.00	5.57E-05	1.53E+04	no	1.53E+04
Methyl ethyl ketone	0.0011234	4.5	0.08951	9.80E-06	0.00	6.29E-05	1.44E+04	no	1.44E+04
Methyl isobutyl ketone	0.00574	134	0.075	7.80E-06	0.10	1.27E-04	4.84E+03	yes	1.08E+04
Methylene chloride	0.08979	10	0.101	1.17E-05	0.01	4.58E-03	1.69E+03	yes	1.08E+04
Naphthalene	0.019803	1191	0.059	7.50E-06	0.85	6.52E-05	1.41E+04	no	1.41E+04
Nitrobenzene	0.0009799	64.6	0.076	8.60E-06	0.05	3.09E-05	2.05E+04	no	2.05E+04
Styrene	0.11275	912	0.071	8.00E-06	0.65	5.55E-04	7.05E+03	yes	1.08E+04
Tetrachloroethylene	0.7544	265	0.072	8.20E-06	0.19	5.41E-03	1.55E+03	yes	1.08E+04
Toluene	0.27224	140	0.087	8.60E-06	0.10	7.85E-03	1.29E+03	yes	1.08E+04
Trichloroethylene	0.4223	94.3	0.079	9.10E-06	0.07	4.02E-03	1.80E+03	yes	1.08E+04
Xylenes (ortho)	0.30094	196	0.07	0.0000078	0.14	4.02E-03	1.80E+03	yes	1.08E+04
Xylenes (total)	0.30094	196	0.07	0.0000078	0.14	4.02E-03	1.80E+03	yes	1.08E+04

Table B-4. Mass limit volatilization model.

$$VF = Q / C \frac{(T \times 3.15 \times 10^7 \text{ s / yr})}{\rho_b \times d \times 10^6 \text{ g / Mg}}$$

Parameter (units)	Symbol	Value
Average Source Depth (m)	d	3.35
Exposure Interval (yr)	T_mass	25
Inverse mean concentrations at center of a square source (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	Q_over_C_mass	68.81
Dry bulk soil density (Mg/m <sup>3</sup> )	D_mass	1.5
Mass Limit Volatilization Factor		1.08E+04

## **Appendix C**

### **Radionuclide Screening Tables**

Table C-1. Summary of design inventory COPC screening process.

Radionuclide	Half Life (Years)	Radiations Emitted	Concentration (Ci/kg)	Yes (Y)/No (N)	(risk/y per pCi/g or pCi)	HEAST Slope Factors	
						Gaseous Element	Total Risk
Ac-225	2.74E - 02	$\alpha, \beta, \gamma$	5.12E - 17	N	4.50E - 08 E	6.563E - 14	Included - retained due to U-233 parent concentration Included
Ac-227	2.18E + 01	$\alpha, \beta, \gamma$	2.04E - 14	N	4.53E - 06 E	1.731E - 14	Included - retained due to Ra-228 and Th-232 parent half- life and concentration
Ac-228	7.00E - 04	$\beta, \gamma$	1.52E - 19	N	2.09E - 07 I	5.55E - 12 SI	
Ag-106	4.57E - 05	$\beta, \gamma$	0.00E + 00	N	3.08E - 06 E	0.000E + 00	Excluded - half life and Concentration/Risk
Ag-108	4.51E - 06	$\beta, \gamma$	3.69E - 18	N	8.56E - 08 E	----- I	Excluded - half life and Concentration/Risk
Ag-108m	1.27E + 02	$\beta, \gamma$	8.00E - 10	N	7.66E - 09 E	9.416E - 19	Included Excluded - half life and Concentration/Risk
Ag-109m	1.26E - 06	$\beta, \gamma$	4.92E - 21	N	----- I	----- SI	
Ag-110	7.80E - 07	$\beta, \gamma$	5.18E - 20	N	1.69E - 07 E	2.187E - 16	Excluded - half life and Concentration/Risk
Ag-110m	6.85E - 01	$\beta, \gamma$	5.55E - 18	N	1.30E - 05 E	1.802E - 12	Excluded - Concentration/Risk
					2.83E - 11 I		
					2.37E - 11 SI		

Table C-1. (continued).

Radionuclide	Half Life (Years)	Radiations Emitted	Concentration (Ci/kg)	Yes (Y)/No (N)	(risk/y per pCi/g or pCi)	HEAST Slope	
						Gaseous Element Factors	Total Risk Screening Results
Ag-111	2.04E - 02	$\beta,\gamma$	0.00E + 00	N		1.09E - 07 E 6.66E - 12 I	0.000E + 00 Excluded - Concentration/Risk
						2.37E - 11 SI	
Am-241	4.32E + 02	$\alpha,\beta,\gamma$	2.38E - 08	N			Included
Am-242	1.83E - 03	$\beta,\gamma$	4.53E - 14	N			Excluded - half life
Am-242m	1.52E + 02	$\alpha,\beta,\gamma$	4.52E - 14	N			Included
Am-243	7.38E + 03	$\alpha,\beta,\gamma$	3.34E - 13	N			Included
Am-245	2.34E - 04	$\beta,\gamma$	0.00E + 00	N			
					1.04E - 07 E 1.56E - 13 I	0.000E + 00	Excluded - half life and Concentration/Risk
					6.11E - 13 SI		
Am-246	7.42E - 05	$\beta,\gamma$	1.38E - 34	N		2.93E - 06 E 1.31E - 13 I	1.013E - 29 Excluded - half life and Concentration/Risk
					2.93E - 13 SI		
At-217	1.02E - 09	$\alpha$	5.12E - 17	N		1.32E - 09 E ----- 1 ----- SI	1.690E - 15 Excluded - half life and Concentration/Risk
					N.L.		
Ba-136m	9.77E - 09	$\beta,\gamma$	0.00E + 00	N		0.000E + 00	Excluded - half life and Concentration/Risk
Ba-137m	4.85E - 06	$\beta,\gamma$	2.31E - 05	N			Excluded - half life - MicroShield, DAC and ALI values include Ba- 137m with Cs-137

Table C-1. (continued).

Radionuclide	Half Life (Years)	Radiations Emitted	Concentration (Ci/kg)	Yes (Y)/No (N)	Gaseous Element Factor (risk/y per pCi/g or pCi)	HEAST Slope Factors	Total Risk	Screening Results
Ba-140	3.48E - 02	$\beta,\gamma$	0.00E + 00	N	7.61E - 07 E 2.03E - 11 I	0.000E + 00	Excluded - Concentration	
Be-10	1.52E + 06	$\beta$	1.14E - 15	N	4.18E - 11 SI	Included		
Bi-210	1.37E - 02	$\beta,\gamma$	1.09E - 15	N		Included		
Bi-211	4.07E - 06	$\alpha,\beta,\gamma$	1.83E - 14	N		Retained due to presence of Ac-227 and Pa-231 parents		
Bi-212	1.15E - 04	$\alpha,\beta,\gamma$	5.53E - 13	N		Retained due to presence of Th-232 parent		
Bi-213	8.69E - 05	$\alpha,\beta,\gamma$	0.00E + 00	N	5.65E - 07 E 6.85E - 11 I	0.000E + 00	Retained due to presence of U-233 parent	
Bi-214	3.79E - 05	$\beta,\gamma$	5.62E - 15	N	1.28E - 12 SI			
Bk-249	8.77E - 01	$\alpha,\beta,\gamma$	2.16E - 30	N	2.63E - 12 E 5.14E - 11 I	1.609E - 30	Excluded - Concentration/Risk	
Bk-250	3.68E - 04	$\alpha,\beta,\gamma$	7.75E - 35	N	2.95E - 12 SI	4.23E - 06 E 1.03E - 12 I	Excluded - half life and Concentration/Risk	
C-14	5.73E + 03	$\beta$	4.61E - 14	N	1.54E - 12 SI	Included		
Cd-109	1.27E + 00	$\beta,\gamma$	4.92E - 21	N	8.73E - 09 E 2.19E - 11 I	1.084E - 18	Excluded - Concentration/Risk	
					1.14E - 11 SI			

Table C-1. (continued).

Radionuclide	Half Life (Years)	Radiations Emitted	Concentration (Ci/kg)	Gaseous Element Yes (Y)/No (N)	HEAST Slope Factors		Total Risk	Screening Results
					(risk/y per pCi/g or pCi)			
Cd-113m	1.36E + 01	$\beta,\gamma$	1.62E - 09	N	1.13E - 07 E	1.206E - 59	Included	
Cd-115m	1.22E - 01	$\beta,\gamma$	4.25E - 63	N	2.92E - 11 I		Excluded - Concentration/Risk	
Ce-141	8.90E - 02	$\beta,\gamma$	1.80E - 80	N	4.74E - 11 SI			
Ce-142	3.78E - 03	$\beta$ (?)	0.00E + 00	N	2.27E - 07 E	1.025E - 76	Excluded - Concentration/Risk	
Ce-144	7.78E - 01	$\beta,\gamma$	1.81E - 12	N	1.14E - 11 I			
Cf-249	3.51E + 02	$\alpha,\gamma$	4.12E - 25	N	1.34E - 11 SI			
C-6	1.31E + 01	$\alpha,\beta,\gamma$	2.11E - 25	N	N.L.		Excluded - Concentration/Risk	
Cf-250					1.37E - 06 E	1.417E - 20	Excluded - Concentration/Risk	
Cf-251	8.98E + 02	$\alpha,\gamma$	9.52E - 28	N	3.40E - 08 I	2.54E - 10 SI		
Cf-252	2.64E + 00	$\alpha,\beta,\gamma(\nu)$	2.24E - 29	N	4.48E - 11 E	1.857E - 23	Excluded - Concentration/Risk	
					2.66E - 08 I			
					1.85E - 10 SI			
					3.76E - 07 E			
					3.40E - 08 I			
					2.67E - 10 SI			
					8.66E - 11 E	4.857E - 29	Excluded - Concentration/Risk	
					-----	-----		
					-----	-----	SI	

Table C-1. (continued).

Radionuclide	Half Life (Years)	Radiations Emitted	Concentration (Ci/kg)	Yes (Y)/No (N)	HEAST Slope Factors (risk/y per pCi/g or pCi)	Total Risk	Screening Results
Cm-241	8.99E - 02	$\alpha, \beta, \gamma$	1.30E - 89	N	1.94E - 06 E 1.01E - 10 I	6.287E - 85	Excluded - Concentration/Risk
Cm-242	4.47E - 01	$\alpha, \beta, \gamma$	5.39E - 26	N	7.73E - 11 E 1.51E - 08 I	2.767E - 24	Excluded - Concentration/Risk
Cm-243	2.85E + 01	$\alpha, \beta, \gamma$	3.55E - 15	N			Included
Cm-244	1.81E + 01	$\alpha, \beta, \gamma$	1.80E - 12	N			Included
Cm-245	8.50E + 03	$\alpha, \gamma$	8.02E - 17	N	2.38E - 07 E 2.77E - 08 I	4.850E - 13	Excluded - Concentration/Risk
Cm-246	4.73E + 03	$\alpha, \gamma$	1.79E - 18	N	2.18E - 10 SI 4.57E - 11 E 2.77E - 08 I	1.710E - 16	Excluded - Concentration/Risk
Cm-247	1.56E + 07	$\alpha, \gamma$	6.39E - 25	N	2.12E - 10 SI 1.31E - 06 E 2.50E - 08 I	2.099E - 20	Excluded - Concentration/Risk
Cm-248	3.39E + 05	$\alpha, \gamma$	1.95E - 25	N	3.42E - 11 E ----- I ----- SI		Excluded - Concentration/Risk
Cm-250	9.70E + 03	$\alpha, \beta, \gamma$	5.53E - 34	N	N.L.	0.000E + 00	Excluded - Concentration/Risk
Co-57	7.42E - 01	$\beta, \gamma$	3.69E - 12	N			Included

Table C-1. (continued).

Radionuclide	Half Life (Years)	Radiations Emitted	Concentration (Ci/kg)	Yes (Y)/No (N)	HEAST Slope Factors (risk/y per pCi/g or pCi)	Total Risk	Screening Results
Co-58	1.94E - 01	$\beta,\gamma$	5.88E - 26	N	4.48E - 06 E 5.99E - 12 I	6.583E - 21	Excluded - Concentration/Risk
Co-60	5.27E + 00	$\beta,\gamma$	1.93E - 07	N	7.44E - 12 SI		Included
Cr-51	7.59E - 02	$\beta,\gamma$	2.30E - 63	N	1.27E - 07 E 1.67E - 13 I	7.311E - 60	Excluded - Concentration/Risk
Cs-132	1.78E - 02	$\beta,\gamma$	0.00E + 00	N	4.96E - 13 SI		
Cs-134	2.06E + 00	$\beta,\gamma$	1.12E - 08	N	3.11E - 06 E 5.92E - 13 I	0.000E + 00	Excluded - Concentration/Risk
Cs-135	2.30E + 06	$\beta$	3.58E - 11	N	2.89E - 12 SI		Included
Cs-136	3.59E - 02	$\beta,\gamma$	0.00E + 00	N	1.00E - 05 E 3.49E - 12 I	0.000E + 00	Excluded - Concentration/Risk
C-8					1.65E - 11 SI		
Cs-137	3.00E + 01	$\beta,\gamma$	2.44E - 05	N	9.10E - 11 E 3.85E - 12 I	0.000E + 00	Excluded - Concentration/Risk
Er-169	2.55E - 02	$\beta,\gamma$	0.00E + 00	N	7.36E - 12 SI		
Eu-150	1.44E - 03	$\beta,\gamma$	1.73E - 17	N	1.95E - 07 E 1.03E - 12 I	8.435E - 14	Excluded - half life and Concentration/Risk
Eu-152	1.33E + 01	$\beta,\gamma$	9.68E - 07	N			Included
Eu-154	8.80E + 00	$\beta,\gamma$	8.21E - 07	N			Included

Table C-1. (continued).

Radionuclide	Half Life (Years)	Radiations Emitted	Concentration (Ci/kg)	Yes (Y)/No (N)	Gaseous Element (risk/y per pCi/g or pCi)	Total Risk	HEAST Slope Factors	Screening Results
Eu-155	4.96E + 00	$\beta,\gamma$	1.76E - 07	N	6.62E - 06 E 1.37E - 11 I	0.000E + 00	Included Excluded - Concentration/Risk	
Eu-156	4.16E - 02	$\beta,\gamma$	0.00E + 00	N	3.56E - 11 SI			
Fe-59	1.22E - 01	$\beta,\gamma$	4.51E - 44	N	5.83E - 06 E 1.33E - 11 I	6.574E - 39	Excluded - Concentration/Risk	
Fr-221	9.13E - 06	$\alpha,\beta,\gamma$	5.12E - 17	N	2.07E - 11 SI 1.11E - 07 E ----- I ----- SI		Retained due to presence of Th-229 and U-233 parents	
Fr-223	4.15E - 05	$\beta,\gamma$	2.82E - 16	N	1.40E - 07 E 3.06E - 12 I 1.78E - 11 SI	9.892E - 13	Retained due to presence of Pa-231 parent	
Gd-152	1.08E + 14	$\alpha$	2.72E - 23	N	0.00E00 E 9.10E - 09 I	8.070E - 22	Excluded - Concentration/Risk	
Gd-153	6.63E - 01	$\beta,\gamma$	2.01E - 20	N	6.29E - 11 SI 1.62E - 07 E 6.55E - 12 I 4.26E - 12 SI	8.149E - 17	Excluded - Concentration/Risk	
H-3	1.24E + 01	$\beta$	4.96E - 08	Y			Included	
Hf-181	1.16E - 01	$\beta,\gamma$	7.80E - 46	N	2.24E - 06 E 1.76E - 11 I 1.79E - 11 SI	4.368E - 41	Excluded - Concentration/Risk	
Ho-166m	3.06E - 03	$\beta,\gamma$	2.70E - 15	N			Included	

Table C-1. (continued).

Radionuclide	Half Life (Years)	Radiations Emitted	Concentration (Ci/kg)	Yes (Y)/No (N)	(risk/y per pCi/g or pCi)	HEAST Slope Factors		Total Risk	Screening Results
						Gaseous Element	HEAST Slope Factors		
I-129	1.57E + 07	$\beta,\gamma$	1.30E - 09	N		1.59E - 06 E	0.000E + 00	Included	
I-131	2.20E - 02	$\beta,\gamma$	0.00E + 00	N		1.95E - 11 I		Excluded - Concentration/Risk	
In-114	2.28E - 06	$\beta,\gamma$	1.89E - 63	N		1.35E - 08 E	6.365E - 61	Excluded - half life and Concentration/Risk	
In-114m	1.36E - 01	$\beta,\gamma$	1.97E - 63	N		3.57E - 07 E	1.765E - 59	Excluded - Concentration/Risk	
In-115	5.10E + 15	$\beta$	5.78E - 21	N		3.00E - 11 I			
In-115m	5.13E - 04	$\beta,\gamma$	0.00E + 00	N		7.03E - 11 SI	2.70E - 10 E	1.102E - 19	Excluded - Concentration/Risk
K-40	1.28E + 09	$\beta,\gamma$	1.92E - 09	N		4.03E - 10 I			
Kr-81	2.10E + 05	$\gamma$	5.30E - 18	Y		5.85E - 11 SI	6.27E - 07 E	0.000E + 00	Excluded - half life and Concentration/Risk
Kr-85	1.07E + 01	$\beta,\gamma$	1.16E - 06	Y		1.24E - 12 SI			
						Included			
						Excluded - Concentration/Risk and Noble Gas			
						Excluded - Noble Gas			

Table C-1. (continued).

Radionuclide	Half Life (Years)	Radiations Emitted	Concentration (Ci/kg)	Gaseous Element Yes (Y)/No (N)	HEAST Slope Factors (risk/y per pCi/g or pCi)	Total Risk	Screening Results
La-138	1.35E + 11	$\beta,\gamma$	0.00E + 00	N	6.07E - 06 E 3.05E - 10 I	0.000E + 00	Excluded - Concentration/Risk
La-140	4.60E - 03	$\beta,\gamma$	2.65E - 114	N	1.15E - 05 E 4.77E - 12 I	7.613E - 109	Excluded - Concentration/Risk
Mn-54	8.58E - 01	$\beta,\gamma$	1.93E - 17	N	3.89E - 06 E 5.88E - 12 I	1.878E - 12	Excluded - Concentration/Risk
Nb-92	3.70E + 07	$\beta$	6.35E - 28	N	N.L.	0.000E + 00	Excluded - Concentration/Risk
Nb-93m	1.36E + 01	$\gamma$	1.35E - 11	N			Included
Nb-94	2.03E + 04	$\beta,\gamma$	8.83E - 15	N			Included
Nb-95	9.64E - 02	$\beta,\gamma$	4.80E - 42	N	3.53E - 06 E 5.44E - 12 I	4.237E - 37	Excluded - Concentration/Risk
Nb-95m	9.89E - 03	$\beta,\gamma$	1.84E - 44	N	6.36E - 12 SI 2.32E - 07 E 3.27E - 12 I 1.05E - 11 SI	1.068E - 40	Excluded - Concentration/Risk
Nd-144	2.10E + 15	$\alpha$	3.27E - 19	N	N.L.	0.000E + 00	Excluded - Concentration/Risk
Nd-147	3.01E - 02	$\beta,\gamma$	0.00E + 00	N	4.87E - 07 E 9.35E - 12 I 2.01E - 11 SI	0.000E + 00	Excluded - Concentration/Risk

Table C-1. (continued).

Radionuclide	Half Life (Years)	Radiations Emitted	Concentration (Ci/kg)	Gaseous Element Yes (Y)/No (N)	HEAST Slope Factors (risk/y per pCi/g or pCi)	Total Risk	Screening Results
Np-235	1.08E + 00	$\beta,\gamma$	6.80E - 20	N	2.13E - 09 E 1.15E - 12 I	3.634E - 18	Excluded - Concentration/Risk
Np-236	1.15E + 05	$\beta,\gamma$	6.93E - 17	N	9.99E - 13 SI 3.25E - 07 E 9.77E - 10 I	5.636E - 13	Excluded - Concentration/Risk
Np-237	2.14E + 06	$\alpha,\beta,\gamma$	6.43E - 10	N	3.19E - 12 SI	Included	
Np-238	5.81E - 03	$\beta,\gamma$	2.18E - 16	N	2.62E - 06 E 4.18E - 12 I	1.428E - 11 I	Included
C-12					1.52E - 11 SI	Included	
Np-239	6.47E - 03	$\beta,\gamma$	3.34E - 13	N	5.80E - 06 E 1.95E - 13 I	4.048E - 18	Excluded - half life and Concentration/Risk
Np-240	1.24E - 04	$\beta,\gamma$	2.79E - 23	N	5.55E - 13 SI		
Np-240m	1.41E - 05	$\beta,\gamma$	2.54E - 20	N	1.51E - 06 E ----- -----	9.581E - 16 I SI	Excluded - half life and Concentration/Risk
Pa-231	3.28E + 04	$\alpha,\beta,\gamma$	6.98E - 14	N	-----	Included	
Pa-233	7.40E - 02	$\beta,\gamma$	4.36E - 11	N	-----	Included	
Pa-234	7.65E - 04	$\beta,\gamma$	2.74E - 15	N	-----	Retained due to presence of U-238 parent	
Pa-234m	2.23E - 06	$\beta,\gamma$	1.71E - 12	N	-----	Retained due to presence of U-238 parent	

Table C-1. (continued).

Radionuclide	Half Life (Years)	Radiations Emitted	Concentration (Ci/kg)	Gaseous Element Yes (Y)/No (N)	HEAST Slope Factors (risk/y per pCi/g or pCi)	HEAST Slope	
						Total Risk	Screening Results
Pb-209	3.71E - 04	$\alpha, \beta, \gamma$	4.85E - 17	N	5.37E - 10 E 1.90E - 13 I 6.55E - 13 SI	6.573E - 16	Retained due to presence of Th-229 and U-233 parents
Pb-210	2.23E + 01	$\alpha, \gamma$	1.09E - 15	N	Included		
Pb-211	6.87E - 05	$\alpha, \gamma$	1.83E - 14	N	Retained due to presence of Pa-231 parent		
Pb-212	1.21E - 03	$\alpha$	5.53E - 13	N	Retained due to presence of Th-232 parent		
Pb-214	5.10E - 05	$\alpha, \gamma$	5.62E - 15	N	Retained due to presence of Ra-226 parent		
Pd-107	6.50E + 06	$\beta$	6.12E - 12	N	Included		
Pm-146	5.53E + 00	$\beta, \gamma$	5.81E - 12	N	Included		
Pm-147	2.62E + 00	$\beta$	3.82E - 07	N	Included		
Pm-148	1.47E - 02	$\beta, \gamma$	3.97E - 68	N	2.80E - 06 E 1.05E - 11 I	2.782E - 63 4.96E - 11 SI	Excluded - Concentration
Pm-148m	1.13E - 01	$\beta, \gamma$	8.23E - 67	N	8.98E - 06 E 2.12E - 11 I	1.848E - 61 2.13E - 11 SI	Excluded - Concentration/Risk
Po-210	3.78E - 01	$\alpha, \gamma$	1.02E - 15	N	Included		
Po-211	1.64E - 08	$\alpha, \gamma$	6.84E - 19	N	3.58E - 08 E ----- I ----- SI	6.1125E - 16 ----- I ----- SI	Retained due to presence of Pa-231 parent

Table C-1. (continued).

Radionuclide	Half Life (Years)	Radiations Emitted	Concentration (Ci/kg)	Yes (Y)/No (N)	(risk/y per pCi/g or pCi)	HEAST Slope Factors		Screening Results
						Gaseous Element	Total Risk	
Po-212	9.67E - 15	$\alpha$	3.28E - 13	N	0.00E00 E -----	0.000E + 00	Retained due to presence of Th-232 parent	
Po-213	1.33E - 13	$\alpha$	4.34E - 17	N	0.00E00 E -----	1	Retained due to presence of Th-229 and U-233 parents	
Po-214	5.20E - 12	$\alpha,\gamma$	5.62E - 15	N	-----	SI	Retained due to presence of Ra-226 parent	
Po-215	5.64E - 11	$\alpha$	1.83E - 14	N	-----	-----	Retained due to presence of Pa-231 parent	
Po-216	4.76E - 09	$\alpha$	5.53E - 13	N	-----	-----	Retained due to presence of Th-232 parent	
Po-218	5.80E - 06	$\alpha$	5.62E - 15	N	-----	-----	Retained due to presence of Ra-226 parent	
Pr-143	3.73E - 02	$\beta$	0.00E + 00	N	1.63E - 09 E 9.73E - 12 I 2.29E - 11 SI	0.000E + 00	Excluded - Concentration/Risk	
Pr-144	3.29E - 05	$\beta,\gamma$	1.77E - 12	N	-----	-----	Excluded - half life	
Pr-144m	1.37E - 05	$\beta,\gamma$	2.53E - 14	N	-----	-----	Excluded - half life	
Pu-236	2.85E + 00	$\alpha,\beta,\gamma$	5.53E - 15	N	-----	-----	Included	
Pu-237	1.24E - 01	$\alpha,\beta,\gamma$	1.21E - 67	N	1.12E - 07 E 1.27E - 12 I 1.62E - 12 SI	3.389E - 64	Excluded - Concentration/Risk	

Table C-1. (continued).

Radionuclide	Half Life (Years)	Radiations Emitted	Concentration (Ci/kg)	Yes (Y)/No (N)	Gaseous Element		HEAST Slope Factors (risk/y per pCi/g or pCi)	Total Risk	Screening Results
Pu-238	8.77E + 01	$\alpha, \beta, \gamma$	2.33E - 07	N					Included
Pu-239	2.41E + 04	$\alpha, \beta, \gamma$	6.66E - 09	N					Included
Pu-240	6.54E + 03	$\alpha, \beta, \gamma$	1.50E - 09	N					Included
Pu-241	1.44E + 01	$\alpha, \beta, \gamma$	6.39E - 08	N					Included
Pu-242	3.76E + 05	$\alpha, \gamma$	2.41E - 13	N					Included
Pu-243	5.66E - 04	$\beta, \gamma$	6.39E - 25	N					Included
Pu-244	8.26E + 07	$\alpha, \gamma$	2.54E - 20	N					
Pu-246	2.99E - 02	$\beta, \gamma$	1.38E - 34	N					
Ra-222	1.21E - 06	$\alpha, \gamma$	1.17E - 125	N					
Ra-223	3.12E - 02	$\alpha, \beta, \gamma$	2.03E - 14	N					Included
Ra-224	1.00E - 02	$\alpha, \beta, \gamma$	5.53E - 13	N					Included
Ra-225	4.05E - 02	$\beta, \gamma$	5.12E - 17	N					Retained due to presence of Th-229 parent
Ra-226	1.60E + 03	$\alpha, \beta, \gamma$	4.74E - 10	N					Included

Table C-1. (continued).

Radionuclide	Half Life (Years)	Radiations Emitted	Concentration (Ci/kg)	Yes (Y)/No (N)	(risk/y per pCi/g or pCi)	HEAST Slope Factors		Screening Results
						Gaseous Element	Total Risk	
Ra-228	5.75E + 00	$\beta$	1.52E - 19	N	0.00E00 E 5.18E - 09 I		7.007E - 17	Excluded - Concentration/Risk
Rb-86	5.12E - 02	$\beta,\gamma$	0.00E + 00	N	2.28E - 09 SI 4.67E - 07 E 4.00E - 12 I		0.000E + 00	Excluded - Concentration/Risk
Rb-87	4.70E + 10	$\beta$	1.11E - 14	N	2.37E - 11 SI	Included		
Rh-102	2.90E + 00	$\beta,\gamma$	2.97E - 14	N		Included		
Rh-103m	1.07E - 04	$\beta,\gamma$	2.83E - 67	N	9.31E - 11 E 9.14E - 15 I	Excluded - half life and Concentration/Risk	6.590E - 67	
C-16					2.40E - 14 SI			
Rh-106	9.48E - 07	$\beta,\gamma$	1.14E - 11	N		Excluded - half life		
Rn-218	1.11E - 09	$\alpha,\gamma$	1.26E - 125	Y	3.39E - 09 E ----- I ----- SI	Excluded - half life, Concentration and Noble Gas	1.068E - 123	
Rn-219	1.26E - 07	$\alpha,\beta,\gamma$	2.03E - 14	Y		Retained due to presence of Pa-231 parent		
Rn-220	1.76E - 06	$\alpha,\gamma$		Y		Retained due to presence of Th-232 parent		
Rn-222	1.05E - 02	$\alpha,\gamma$		Y		Retained due to presence of Ra-226 parent		

Table C-1. (continued).

Radionuclide	Half Life (Years)	Radiations Emitted	Concentration (Ci/kg)	Yes (Y)/No (N)	(risk/y per pCi/g or pCi)	HEAST Slope Factors		Total Risk	Screening Results
						Gaseous Element	HEAST Slope Factors		
Ru-103	1.08E - 01	$\beta,\gamma$	2.01E - 38	N		2.04E - 06 E	1.024E - 33	Excluded - Concentration/Risk	
						8.92E - 12 I			
Ru-106	1.01E + 00	$\beta$	1.21E - 11	N		1.05E - 11 SI			Included
Sb-124	1.65E - 01	$\beta,\gamma$	2.07E - 49	N		8.89E - 06 E	4.609E - 44	Excluded - Concentration/Risk	
						2.43E - 11 I			
Sb-125	2.77E + 00	$\beta,\gamma$	9.27E - 09	N		3.50E - 11 SI			Included
Sb-126	3.40E - 02	$\beta,\gamma$	2.06E - 11	N					Included
Sb-126m	3.61E - 05	$\beta,\gamma$	1.47E - 10	N					Excluded - Concentration/Risk
Sc-46	2.30E - 01	$\beta,\gamma$	2.85E - 29	N		9.63E - 06 E	6.851E - 24	Excluded - Concentration/Risk	
						2.47E - 11 I			
						1.62E - 11 SI			
Se-79	6.50E + 04	$\beta$	1.66E - 10	N					Included
Sm-146	1.03E + 08	$\alpha$	4.26E - 19	N		0.00E00 E	1.339E - 17	Excluded - Concentration/Risk	
						7.88E - 09 I			
Sm-147	1.06E + 11	$\alpha$	4.10E - 15	N		0.00E00 E			Included
Sm-148	7.00E + 15	$\alpha$	1.01E - 21	N		N.L.	0.000E + 00	Excluded - Concentration/Risk	
Sm-149	1.00E + 16	$\alpha$	5.12E - 21	N					Excluded - Concentration/Risk
Sm-151	9.00E + 01	$\beta,\gamma$	3.38E - 07	N		0.000E + 00			Included

Table C-1. (continued).

Radionuclide	Half Life (Years)	Radiations Emitted	Concentration (Ci/kg)	Yes (Y)/No (N)	Gaseous Element Factor (risk/y per pCi/g or pCi)	HEAST Slope Factors	Total Risk	Screening Results
Sn-117m	3.73E - 02	$\beta,\gamma$	0.00E + 00	N	4.69E - 07 E 8.84E - 12 I	0.000E + 00	Excluded - Concentration/Risk	
Sn-119m	8.03E - 01	$\beta,\gamma$	1.48E - 16	N	1.20E - 09 E 7.81E - 12 I	4.638E - 15	Included	
Sn-121m	5.50E + 01	$\beta,\gamma$	2.69E - 11	N	6.36E - 12 SI			
Sn-123	3.53E - 01	$\beta,\gamma$	8.42E - 26	N	3.88E - 08 E 3.03E - 11 I	8.233E - 23	Excluded - Concentration/Risk	
Sn-125	2.64E - 02	$\beta,\gamma$	0.00E + 00	N	4.03E - 11 SI 1.53E - 06 E 1.41E - 11 I	0.000E + 00	Excluded - Concentration/Risk	
Sn-126	1.00E + 05	$\gamma$	1.47E - 10	N	5.81E - 11 SI			
Sr-89	1.38E - 01	$\beta,\gamma$	5.99E - 53	N	7.19E - 09 E 2.34E - 11 I	1.117E - 50	Excluded - Concentration/Risk	
Sr-90	2.91E + 01	$\beta$	2.29E - 05	N	3.47E - 11 SI			
Tb-160	1.98E - 01	$\beta,\gamma$	3.18E - 43	N	5.23E - 06 E 2.45E - 11 I	4.154E - 38	Excluded - Concentration/Risk	
Tb-161	1.89E - 02	$\beta,\gamma$	0.00E + 00	N	2.42E - 11 SI 3.44E - 08 E 5.03E - 12 I	0.000E + 00	Excluded - Concentration/Risk	
					1.38E - 11 SI			

Table C-1. (continued).

Radionuclide	Half Life (Years)	Radiations Emitted	Concentration (Ci/kg)	Gaseous Element Yes (Y)/No (N)	HEAST Slope Factors (risk/y per pCi/g or pCi)	Total Risk	Screening Results
Tc-98	4.20E + 06	$\beta,\gamma$	1.77E - 16	N	6.45E - 06 E 3.01E - 11 I	2.850E - 11	Included
Tc-99	2.13E + 05	$\beta$	5.76E - 09	N	1.83E - 11 SI		Included
Te-123	1.00E + 13	$\gamma$	4.52E - 24	N	2.73E - 09 E 2.50E - 12 I	3.147E - 22	Excluded - Concentration/Risk
Te-123m	3.29E - 01	$\beta,\gamma$	2.95E - 32	N	6.77E - 12 SI 4.48E - 07 E 1.36E - 11 I	3.301E - 28	Excluded - Concentration/Risk
Te-125m	1.59E - 01	$\beta,\gamma$	2.27E - 09	N	1.02E - 11 SI		Included
Te-127	1.07E - 03	$\beta,\gamma$	9.36E - 29	N	2.10E - 08 E 6.11E - 13 I	4.919E - 26	Excluded - half life and Concentration/Risk
Te-127m	2.99E - 01	$\beta,\gamma$	9.50E - 29	N	2.87E - 12 SI 2.73E - 09 E 2.58E - 11 I	6.910E - 27	Excluded - Concentration/Risk
Te-129	1.32E - 04	$\beta,\gamma$	6.75E - 80	N	2.25E - 11 SI 2.45E - 07 E 9.95E - 14 I	4.134E - 76	Excluded - half life and Concentration/Risk
Te-129m	9.21E - 02	$\beta,\gamma$	1.07E - 79	N	4.40E - 13 SI 1.38E - 07 E 2.49E - 11 I	3.706E - 76	Excluded - Concentration/Risk
					4.26E - 11 SI		

Table C-1. (continued).

Radionuclide	Half Life (Years)	Radiations Emitted	Concentration (Ci/kg)	Gaseous Element Yes (Y)/No (N)	HEAST Slope Factors		Total Risk	Screening Results
					(risk/y per pCi/g or pCi)	(risk/y per pCi/g or pCi)		
Th-226	5.88E - 05	$\alpha, \beta, \gamma$	2.18E - 126	N	2.36E - 06 E	1.286E - 121	Excluded - half life and Concentration/Risk	
Th-227	5.12E - 02	$\alpha, \beta, \gamma$	1.82E - 14	N	1.56E - 10 I	1.58E - 12 SI	Included	
Th-228	1.91E + 00	$\alpha, \beta, \gamma$	3.29E - 11	N			Included	
Th-229	7.34E + 03	$\alpha, \beta, \gamma$	5.12E - 17	N	2.25E - 07 E	3.101E - 13	Retained due to the presence of U-233 parent	
					1.75E - 07 I			
					4.96E - 10 SI			
Th-230	7.70E + 04	$\alpha, \beta, \gamma$	1.73E - 10	N			Included	
Th-231	2.91E - 03	$\beta, \gamma$	1.61E - 10	N			Included	
Th-232	1.41E + 10	$\alpha, \beta, \gamma$	1.56E - 10	N			Included	
Th-234	6.60E - 02	$\beta, \gamma$	1.71E - 12	N			Included	
Tl-207	9.08E - 06	$\beta, \gamma$	1.83E - 14	N			Retained due to presence of Pa-231 parent	
Tl-208	5.84E - 06	$\beta, \gamma$	1.98E - 13	N			Retained due to presence of Th-232 parent	
Tl-209	4.19E - 06	$\beta, \gamma$	1.05E - 18	N	9.83E - 06 E	2.584E - 13	Retained due to presence of Th-229 and U-233 parents	
					----- I	----- SI		
Tm-170	3.53E - 01	$\beta, \gamma$	6.38E - 35	N	1.01E - 08 E	1.643E - 32	Excluded - Concentration/Risk	
					2.43E - 11 I			
					2.59E - 11 SI			

Table C-1. (continued).

Radionuclide	Half Life (Years)	Radiations Emitted	Concentration (Ci/kg)	Gaseous Element Yes (Y)/No (N)	HEAST Slope Factors (risk/y per pCi/g or pCi)	Total Risk	Screening Results
Tm-171	1.92E + 00	$\beta,\gamma$	1.59E - 21	N	6.97E - 10 E 3.33E - 12 I	2.843E - 20	Excluded - Concentration/Risk
U-230	5.70E - 02	$\alpha,\beta,\gamma$	0.00E + 00	N	3.07E - 09 E 4.55E - 08 I	0.000E + 00	Excluded - Concentration/Risk
U-232	7.20E + 01	$\alpha,\beta,\gamma$	5.35E - 13	N	5.66E - 10 SI	Included	
U-233	1.59E + 05	$\alpha,\beta,\gamma$	2.56E - 14	N		Included	
U-234	2.45E + 05	$\alpha,\gamma$	6.03E - 09	N		Included	
U-235	7.04E + 08	$\alpha,\gamma$	1.10E - 10	N		Included	
U-236	2.34E + 07	$\alpha,\beta,\gamma$	2.02E - 10	N		Included	
U-237	1.85E - 02	$\beta,\gamma$	0.00E + 00	N	3.76E - 07 E 6.44E - 12 I 1.39E - 11 SI	0.000E + 00	Excluded - Concentration/Risk
U-238	4.47E + 09	$\alpha,\beta,\gamma$	1.95E - 09	N		Included	
U-240	1.61E - 03	$\beta,\gamma$	2.54E - 20	N	7.33E - 10 E 2.96E - 12 I 2.02E - 11 SI	5.665E - 19	Excluded - half life and Concentration/Risk
Xe-127	9.97E - 02	$\beta,\gamma$	1.58E - 81	Y	9.52E - 07 E ----- ----- SI	3.762E - 77 ----- ----- SI	Excluded - Concentration/Risk and Noble Gas
Xe-129m	2.19E - 02	$\beta,\gamma$	0.00E + 00	Y	4.25E - 08 E ----- ----- SI	0.000E + 00	Excluded - Concentration/Risk and Noble Gas

Table C-1. (continued).

Radionuclide	Half Life (Years)	Radiations Emitted	Concentration (Ci/kg)	Gaseous Element Yes (Y)/No (N)	HEAST Slope Factors (risk/y per pCi/g or pCi)	Total Risk	Screening Results
Xe-131m	3.26E - 02	$\beta,\gamma$	2.69E - 121	Y	1.41E - 08 E ----- I ----- SI	9.486E - 119	Excluded - Concentration/Risk and Noble Gas
Xe-133	1.44E - 02	$\beta,\gamma$	0.00E + 00	Y	6.62E - 08 E ----- I ----- SI	0.000E + 00	Excluded - Concentration/Risk and Noble Gas
Y-90	7.31E - 03	$\beta$	2.29E - 05	N	2.51E - 08 E 3.36E - 11 I	2.639E - 43	Included
Y-91	1.60E - 01	$\beta,\gamma$	4.14E - 46	N	4.66E - 11 SI		Excluded - Concentration/Risk
Zn-65	6.68E - 01	$\beta,\gamma$	2.70E - 18	N	2.81E - 06 E 5.81E - 12 I 2.45E - 11 SI	1.895E - 13	Excluded - Concentration/Risk
Zr-93	1.53E + 06	$\beta$	8.57E - 10	N		3.40E - 06 E	Included
Zr-95	1.75E - 01	$\beta,\gamma$	2.93E - 34	N		2.486E - 29	Excluded - Concentration/Risk
						1.23E - 11 SI	

Table C-2. Evaluation of design inventory radionuclide contribution to external exposure.

Radionuclide	Radiations Emitted	External Exposure Rate (mR/h)	% of Total Exposure Rate
Ac-225	$\alpha, \beta, \gamma$	1.9426E - 09	0.00%
Ac-227	$\alpha, \beta, \gamma$	5.7182E - 10	0.00%
Ac-228	$\beta, \gamma$	3.3106E - 01	0.00%
Ag-108m	$\beta, \gamma$	7.5773E - 01	0.01%
Am-241	$\alpha, \beta, \gamma$	9.1166E - 02	0.00%
Am-242m	$\alpha, \beta, \gamma$	2.5402E - 09	0.00%
Am-243	$\alpha, \beta, \gamma$	5.5987E - 06	0.00%
Be-10	$\beta$	N/A	
Bi-210	$\beta, \gamma$	N/A	
Bi-211	$\alpha, \beta, \gamma$	1.0250E - 02	0.00%
Bi-212	$\alpha, \beta, \gamma$	6.2640E - 02	0.00%
Bi-213	$\alpha, \beta, \gamma$	4.0997E - 09	0.00%
C-14	$\beta, \gamma$	1.4587E + 00	0.01%
Cd-109	$\beta, \gamma$	N/A	
Cd-113m	$\beta, \gamma$	N/A	
Ce-144	$\beta, \gamma$	1.4086E - 04	0.00%
Cm-243	$\alpha, \beta, \gamma$	1.3559E - 06	0.00%
Cm-244	$\alpha, \beta, \gamma$	4.8802E - 09	0.00%
Co-57	$\beta, \gamma$	1.1170E - 04	0.00%
Co-60	$\beta, \gamma$	3.7901E + 02	2.67%
Cs-134	$\beta, \gamma$	1.1683E + 01	0.08%
Cs-135	$\beta$	N/A	
Cs-137	$\beta, \gamma$	8.6227E + 03	60.65%
Eu-152	$\beta, \gamma$	2.3904E + 03	16.81%
Eu-154	$\beta, \gamma$	2.3040E + 03	16.21%
Eu-155	$\beta, \gamma$	4.9507E + 02	3.48%
Fr-221	$\alpha, \beta, \gamma$	7.0978E - 10	0.00%
Fr-223	$\beta, \gamma$	3.0514E - 08	0.00%
H-3	$\beta$	N/A	
Ho-166m	$\beta, \gamma$	1.0977E - 05	0.00%
I-129	$\beta, \gamma$	1.6517E - 02	0.00%
K-40	$\beta, \gamma$	2.4394E - 01	0.00%
Nb-93m	$\gamma$	3.1196E - 04	0.00%
Nb-94	$\beta, \gamma$	9.2909E - 06	0.00%

Table C-2. (continued).

Radionuclide	Radiations Emitted	External Exposure Rate (mR/h)	% of Total Exposure Rate
Np-237	$\alpha, \beta, \gamma$	3.7642E - 02	0.00%
Np-238	$\beta, \gamma$	2.5747E - 07	0.00%
Np-239	$\beta, \gamma$	1.6502E - 04	0.00%
Np-240	$\beta, \gamma$	6.3302E - 06	0.00%
Pa-231	$\alpha, \beta, \gamma$	2.7922E - 02	0.00%
Pa-233	$\beta, \gamma$	1.2400E - 05	0.00%
Pa-234	$\beta, \gamma$	1.3563E - 05	0.00%
Pa-234m	$\beta, \gamma$	N/A	
Pb-209	$\alpha, \beta, \gamma$	1.5163E - 04	0.00%
Pb-210	$\alpha, \gamma$	6.4613E - 07	0.00%
Pb-211	$\alpha, \gamma$	N/A	
Pb-212	$\alpha$	3.4474E - 01	0.00%
Pb-214	$\alpha, \gamma$	N/A	
Pd-107	$\beta$	3.5741E - 03	0.00%
Pm-146	$\beta, \gamma$	N/A	
Pm-147	$\beta$	2.7072E - 06	0.00%
Po-210	$\alpha, \gamma$	2.9117E - 10	0.00%
Po-211	$\alpha, \gamma$	N/A	
Po-212	$\alpha$	N/A	
Po-213	$\alpha$	2.6453E - 05	0.00%
Po-214	$\alpha, \gamma$	N/A	
Po-215	$\alpha$	N/A	
Po-216	$\alpha$	N/A	
Po-218	$\alpha$	4.6670E - 11	0.00%
Pu-236	$\alpha, \beta, \gamma$	1.0217E - 03	0.00%
Pu-238	$\alpha, \beta, \gamma$	8.2742E - 05	0.00%
Pu-239	$\alpha, \beta, \gamma$	7.1539E - 06	0.00%
Pu-240	$\alpha, \beta, \gamma$	N/A	
Pu-241	$\alpha, \beta, \gamma$	1.0071E - 09	0.00%
Pu-242	$\alpha, \gamma$	7.8149E - 06	0.00%
Ra-223	$\alpha, \beta, \gamma$	2.0678E - 06	0.00%
Ra-224	$\alpha, \beta, \gamma$	1.1157E - 10	0.00%
Ra-225	$\beta, \gamma$	1.0008E - 03	0.00%
Ra-226	$\alpha, \beta, \gamma$	N/A	

Table C-2. (continued).

Radionuclide	Radiations Emitted	External Exposure Rate (mR/h)	% of Total Exposure Rate
Rb-87	$\beta$	N/A	
Rh-102	$\beta,\gamma$	N/A	
Rn-219	$\alpha,\beta,\gamma$	5.7470E - 07	0.00%
Rn-220	$\alpha,\gamma$	4.7102E - 05	0.00%
Rn-222	$\alpha,\gamma$	1.0349E - 04	0.00%
Ru-106	$\beta,\gamma$	1.5365E - 03	0.00%
Sb-125	$\beta,\gamma$	1.0300E + 01	0.07%
Sb-126	$\beta,\gamma$	1.3241E - 01	0.00%
Se-79	$\beta$	N/A	
Sm-147	$\alpha$	N/A	
Sm-151	$\beta,\gamma$	3.8290E - 04	0.00%
Sn-119m	$\beta,\gamma$	6.1848E - 10	0.00%
Sn-121m	$\beta,\gamma$	N/A	
Sn-126	$\gamma$	1.7381E - 02	0.00%
Sr-90	$\beta$	N/A	
Tc-98	$\beta,\gamma$	1.5725E - 07	0.00%
Tc-99	$\beta$	5.9083E - 07	0.00%
Te-125m	$\beta,\gamma$	3.3926E - 02	0.00%
Th-227	$\alpha,\beta,\gamma$	6.1330E - 06	0.00%
Th-228	$\alpha,\beta,\gamma$	7.5053E - 05	0.00%
Th-229	$\alpha,\beta,\gamma$	1.1061E - 08	0.00%
Th-230	$\alpha,\beta,\gamma$	1.3710E - 05	0.00%
Th-231	$\beta,\gamma$	3.0672E - 03	0.00%
Th-232	$\alpha,\beta,\gamma$	4.9651E - 06	0.00%
Th-234	$\beta,\gamma$	2.8354E - 03	0.00%
Tl-207	$\beta,\gamma$	3.0902E - 08	0.00%
Tl-208	$\beta,\gamma$	6.4397E - 01	0.00%
Tl-209	$\beta,\gamma$	1.7683E - 09	0.00%
U-232	$\alpha,\beta,\gamma$	2.5445E - 08	0.00%
U-233	$\alpha,\beta,\gamma$	1.2446E - 09	0.00%
U-234	$\alpha,\gamma$	1.3460E - 04	0.00%
U-235	$\alpha,\gamma$	5.1322E - 02	0.00%
U-236	$\alpha,\beta,\gamma$	2.6568E - 06	0.00%
U-238	$\alpha,\beta,\gamma$	2.1643E - 05	0.00%

Table C-2. (continued).

Radionuclide	Radiations Emitted	External Exposure Rate (mR/h)	% of Total Exposure Rate
Y-90	$\beta$	N/A	
Zr-93	$\beta$	N/A	
TOTALS:		1.4217E + 04	100.00%

Table C-3. Evaluation of design inventory radionuclide contribution to internal dose from inhalation.

Radionuclide	Radiations Emitted	Dose Rate For Inhalation (mrem/h)	% of Total Dose Rate
Ac-225	$\alpha, \beta, \gamma$	4.0971E - 14	0.00%
Ac-227	$\alpha, \beta, \gamma$	1.2264E - 08	0.00%
Ac-228	$\beta, \gamma$	4.1550E - 09	0.00%
Ag-108m	$\beta, \gamma$	9.5945E - 09	0.00%
Am-241	$\alpha, \beta, \gamma$	9.5333E - 04	8.74%
Am-242m	$\alpha, \beta, \gamma$	1.8074E - 09	0.00%
Am-243	$\alpha, \beta, \gamma$	1.3361E - 08	0.00%
Be-10	$\beta$	2.7411E - 14	0.00%
Bi-210	$\beta, \gamma$	3.7902E - 09	0.00%
Bi-211	$\alpha, \beta, \gamma$	0.0000E + 00	0.00%
Bi-212	$\alpha, \beta, \gamma$	1.8698E - 10	0.00%
Bi-213	$\alpha, \beta, \gamma$	4.0971E - 17	0.00%
C-14	$\beta, \gamma$	1.4213E - 10	0.00%
Cd-109	$\beta, \gamma$	5.5327E - 15	0.00%
Cd-113m	$\beta, \gamma$	1.9445E - 07	0.00%
Ce-144	$\beta, \gamma$	4.3348E - 11	0.00%
Cm-243	$\alpha, \beta, \gamma$	9.4753E - 11	0.00%
Cm-244	$\alpha, \beta, \gamma$	4.3292E - 08	0.00%
Co-57	$\beta, \gamma$	1.2659E - 12	0.00%
Co-60	$\beta, \gamma$	1.5471E - 06	0.01%
Cs-134	$\beta, \gamma$	2.6912E - 08	0.00%
Cs-135	$\beta$	8.5951E - 12	0.00%
Cs-137	$\beta, \gamma$	2.9320E - 05	0.27%
Eu-152	$\beta, \gamma$	1.1611E - 05	0.11%
Eu-154	$\beta, \gamma$	9.8500E - 06	0.09%
Eu-155	$\beta, \gamma$	4.7047E - 07	0.00%
Fr-221	$\alpha, \beta, \gamma$	0.0000E + 00	0.00%
Fr-223	$\beta, \gamma$	8.5849E - 17	0.00%
H-3	$\beta$	1.4869E - 10	0.00%
Ho-166m	$\beta, \gamma$	9.2578E - 14	0.00%
I-129	$\beta, \gamma$	3.4614E - 08	0.00%
K-40	$\beta, \gamma$	1.1502E - 09	0.00%
Nb-93m	$\gamma$	1.0279E - 09	0.00%
Nb-94	$\beta, \gamma$	1.0597E - 13	0.00%

Table C-3. (continued).

Radionuclide	Radiations Emitted	Dose Rate For Inhalation (mrem/h)	% of Total Dose Rate
Np-237	$\alpha, \beta, \gamma$	3.8583E - 05	0.35%
Np-238	$\beta, \gamma$	8.7200E - 16	0.00%
Np-239	$\beta, \gamma$	4.0083E - 14	0.00%
Pa-231	$\alpha, \beta, \gamma$	8.3755E - 09	0.00%
Pa-233	$\beta, \gamma$	1.7422E - 11	0.00%
Pa-234	$\beta, \gamma$	9.4011E - 17	0.00%
Pa-234m	$\beta, \gamma$	0.0000E + 00	0.00%
Pb-209	$\alpha, \beta, \gamma$	2.0486E - 19	0.00%
Pb-210	$\alpha, \gamma$	5.6852E - 07	0.01%
Pb-211	$\alpha, \gamma$	8.1761E - 15	0.00%
Pb-212	$\alpha$	1.2465E - 09	0.00%
Pb-214	$\alpha, \gamma$	1.4213E - 10	0.00%
Pd-107	$\beta$	3.6711E - 12	0.00%
Pm-146	$\beta, \gamma$	3.4862E - 11	0.00%
Pm-147	$\beta$	9.1590E - 07	0.01%
Po-210	$\alpha, \gamma$	1.8951E - 07	0.00%
Po-211	$\alpha, \gamma$	0.0000E + 00	0.00%
Po-212	$\alpha$	0.0000E + 00	0.00%
Po-213	$\alpha$	0.0000E + 00	0.00%
Po-214	$\alpha, \gamma$	0.0000E + 00	0.00%
Po-215	$\alpha$	0.0000E + 00	0.00%
Po-216	$\alpha$	0.0000E + 00	0.00%
Po-218	$\alpha$	0.0000E + 00	0.00%
Pu-236	$\alpha, \beta, \gamma$	6.6352E - 11	0.00%
Pu-238	$\alpha, \beta, \gamma$	8.0023E - 03	73.37%
Pu-239	$\alpha, \beta, \gamma$	2.6649E - 04	2.44%
Pu-240	$\alpha, \beta, \gamma$	6.0006E - 05	0.55%
Pu-241	$\alpha, \beta, \gamma$	5.1123E - 05	0.47%
Pu-242	$\alpha, \gamma$	8.2512E - 09	0.00%
Ra-223	$\alpha, \beta, \gamma$	7.0081E - 12	0.00%
Ra-224	$\alpha, \beta, \gamma$	6.6352E - 11	0.00%
Ra-225	$\beta, \gamma$	1.7559E - 14	0.00%
Ra-226	$\alpha, \beta, \gamma$	1.8951E - 07	0.00%
Ra-228	$\beta$	3.7395E - 08	0.00%

Table C-3. (continued).

Radionuclide	Radiations Emitted	Dose Rate For Inhalation (mrem/h)	% of Total Dose Rate
Rb-87	$\beta$	1.3379E - 15	0.00%
Rh-102	$\beta,\gamma$	1.1891E - 13	0.00%
Rn-219	$\alpha,\beta,\gamma$	0.0000E + 00	0.00%
Rn-220	$\alpha,\gamma$	1.8698E - 12	0.00%
Rn-222	$\alpha,\gamma$	1.1370E - 11	0.00%
Ru-106	$\beta,\gamma$	2.9139E - 10	0.00%
Sb-125	$\beta,\gamma$	4.4510E - 09	0.00%
Sb-126	$\beta,\gamma$	9.8968E - 12	0.00%
Se-79	$\beta$	6.6335E - 11	0.00%
Sm-147	$\alpha$	2.4627E - 11	0.00%
Sm-151	$\beta,\gamma$	8.1007E - 07	0.01%
Sn-119m	$\beta,\gamma$	3.5597E - 17	0.00%
Sn-121m	$\beta,\gamma$	1.2894E - 11	0.00%
Sn-126	$\gamma$	5.8964E - 10	0.00%
Sr-90	$\beta$	1.3723E - 03	12.58%
Tc-98	$\beta,\gamma$	1.4141E - 16	0.00%
Tc-99	$\beta$	1.9733E - 09	0.00%
Te-125m	$\beta,\gamma$	1.3600E - 09	0.00%
Th-227	$\alpha,\beta,\gamma$	1.6123E - 11	0.00%
Th-228	$\alpha,\beta,\gamma$	3.7395E - 06	0.03%
Th-229	$\alpha,\beta,\gamma$	1.3657E - 11	0.00%
Th-230	$\alpha,\beta,\gamma$	6.9393E - 06	0.06%
Th-231	$\beta,\gamma$	4.4093E - 12	0.00%
Th-232	$\alpha,\beta,\gamma$	3.7395E - 05	0.34%
Th-234	$\beta,\gamma$	2.3427E - 09	0.00%
Tl-207	$\beta,\gamma$	0.0000E + 00	0.00%
Tl-208	$\beta,\gamma$	0.0000E + 00	0.00%
Tl-209	$\beta,\gamma$	0.0000E + 00	0.00%
U-232	$\alpha,\beta,\gamma$	1.6044E - 08	0.00%
U-233	$\alpha,\beta,\gamma$	1.5364E - 10	0.00%
U-234	$\alpha,\gamma$	3.6167E - 05	0.33%
U-235	$\alpha,\gamma$	6.6140E - 07	0.01%
U-236	$\alpha,\beta,\gamma$	1.2128E - 06	0.01%
U-238	$\alpha,\beta,\gamma$	1.1713E - 05	0.11%

Table C-3. (continued).

Radionuclide	Radiations Emitted	Dose Rate For Inhalation (mrem/h)	% of Total Dose Rate
Y-90	$\beta$	9.1509E - 06	0.08%
Zr-93	$\beta$	3.4264E - 08	0.00%
Totals		1.0907E - 02	1.0000E + 00

Table C-4. Evaluation of radionuclide contribution to internal dose from inhalation.

Radionuclide	Radiations Emitted	Dose Rate For Ingestion (mrem/d CEDE)	% of Total Dose Rate
Ac-225	$\alpha, \beta, \gamma$	2.5607E - 13	0.00%
Ac-227	$\alpha, \beta, \gamma$	2.5550E - 08	0.00%
Ac-228	$\beta, \gamma$	1.9477E - 08	0.00%
Ag-108m	$\beta, \gamma$	3.3314E - 07	0.00%
Am-241	$\alpha, \beta, \gamma$	7.4479E - 03	2.26%
Am-242m	$\alpha, \beta, \gamma$	1.4121E - 08	0.00%
Am-243	$\alpha, \beta, \gamma$	1.0438E - 07	0.00%
Be-10	$\beta$	2.8553E - 13	0.00%
Bi-210	$\beta, \gamma$	1.4805E - 07	0.00%
Bi-211	$\alpha, \beta, \gamma$	6.3876E - 12	0.00%
Bi-212	$\alpha, \beta, \gamma$	7.7907E - 09	0.00%
Bi-213	$\alpha, \beta, \gamma$	1.8291E - 15	0.00%
C-14	$\beta, \gamma$	5.9221E - 09	0.00%
Cd-109	$\beta, \gamma$	1.2807E - 10	0.00%
Cd-113m	$\beta, \gamma$	2.0256E - 05	0.01%
Ce-144	$\beta, \gamma$	5.6442E - 08	0.00%
Cm-243	$\alpha, \beta, \gamma$	8.8831E - 10	0.00%
Cm-244	$\alpha, \beta, \gamma$	4.5096E - 07	0.00%
Co-57	$\beta, \gamma$	2.3076E - 10	0.00%
Co-60	$\beta, \gamma$	2.4173E - 04	0.07%
Cs-134	$\beta, \gamma$	4.0047E - 05	0.01%
Cs-135	$\beta$	1.2790E - 08	0.00%
Cs-137	$\beta, \gamma$	6.1084E - 02	18.53%
Eu-152	$\beta, \gamma$	3.0236E - 04	0.09%
Eu-154	$\beta, \gamma$	4.1042E - 04	0.12%
Eu-155	$\beta, \gamma$	1.1027E - 05	0.00%
Fr-221	$\alpha, \beta, \gamma$	0.0000E + 00	0.00%
Fr-223	$\beta, \gamma$	3.5770E - 12	0.00%
H-3	$\beta$	1.5488E - 07	0.00%
Ho-166m	$\beta, \gamma$	6.7505E - 15	0.00%
I-129	$\beta, \gamma$	6.4900E - 05	0.02%
K-40	$\beta, \gamma$	4.7925E - 05	0.01%
Nb-93m	$\gamma$	7.1382E - 07	0.00%
Nb-94	$\beta, \gamma$	5.5194E - 11	0.00%

Table C-4. (continued).

Radionuclide	Radiations Emitted	Dose Rate For Ingestion (mrem/d CEDE)	% of Total Dose Rate
Np-237	$\alpha, \beta, \gamma$	3.2152E - 04	0.10%
Np-238	$\beta, \gamma$	5.4500E - 14	0.00%
Np-239	$\beta, \gamma$	4.1753E - 11	0.00%
Pa-231	$\alpha, \beta, \gamma$	8.7245E - 08	0.00%
Pa-233	$\beta, \gamma$	1.0889E - 08	0.00%
Pa-234	$\beta, \gamma$	3.4275E - 13	0.00%
Pa-234m	$\beta, \gamma$	0.0000E + 00	0.00%
Pb-209	$\alpha, \beta, \gamma$	6.4017E - 16	0.00%
Pb-210	$\alpha, \gamma$	1.9740E - 04	0.06%
Pb-211	$\alpha, \gamma$	5.1101E - 13	0.00%
Pb-212	$\alpha$	4.8692E - 07	0.00%
Pb-214	$\alpha, \gamma$	1.3160E - 08	0.00%
Pd-107	$\beta$	5.0987E - 11	0.00%
Pm-146	$\beta, \gamma$	0.0000E + 00	0.00%
Pm-147	$\beta$	1.9081E - 06	0.00%
Po-210	$\alpha, \gamma$	3.9481E - 05	0.01%
Po-211	$\alpha, \gamma$	0.0000E + 00	0.00%
Po-212	$\alpha$	0.0000E + 00	0.00%
Po-213	$\alpha$	0.0000E + 00	0.00%
Po-214	$\alpha, \gamma$	0.0000E + 00	0.00%
Po-215	$\alpha$	0.0000E + 00	0.00%
Po-216	$\alpha$	0.0000E + 00	0.00%
Po-218	$\alpha$	0.0000E + 00	0.00%
Pu-236	$\alpha, \beta, \gamma$	6.9116E - 10	0.00%
Pu-238	$\alpha, \beta, \gamma$	6.4834E - 02	19.66%
Pu-239	$\alpha, \beta, \gamma$	2.0820E - 03	0.63%
Pu-240	$\alpha, \beta, \gamma$	4.6880E - 04	0.14%
Pu-241	$\alpha, \beta, \gamma$	3.9940E - 04	0.12%
Pu-242	$\alpha, \gamma$	7.5206E - 08	0.00%
Ra-223	$\alpha, \beta, \gamma$	1.0220E - 09	0.00%
Ra-224	$\alpha, \beta, \gamma$	1.7279E - 08	0.00%
Ra-225	$\beta, \gamma$	1.6004E - 12	0.00%
Ra-226	$\alpha, \beta, \gamma$	5.9221E - 05	0.02%
Ra-228	$\beta$	1.9477E - 05	0.01%

Table C-4. (continued).

Radionuclide	Radiations Emitted	Dose Rate For Ingestion (mrem/d CEDE)	% of Total Dose Rate
Rb-87	$\beta$	2.7873E - 12	0.00%
Rh-102	$\beta,\gamma$	1.2387E - 11	0.00%
Rn-219	$\alpha,\beta,\gamma$	0.0000E + 00	0.00%
Rn-220	$\alpha,\gamma$	0.0000E + 00	0.00%
Rn-222	$\alpha,\gamma$	0.0000E + 00	0.00%
Ru-106	$\beta,\gamma$	1.5177E - 08	0.00%
Sb-125	$\beta,\gamma$	1.1591E - 06	0.00%
Sb-126	$\beta,\gamma$	1.0309E - 08	0.00%
Se-79	$\beta$	6.9099E - 08	0.00%
Sm-147	$\alpha$	5.1307E - 11	0.00%
Sm-151	$\beta,\gamma$	8.4382E - 06	0.00%
Sn-119m	$\beta,\gamma$	1.2360E - 14	0.00%
Sn-121m	$\beta,\gamma$	2.2385E - 09	0.00%
Sn-126	$\gamma$	1.2284E - 07	0.00%
Sr-90	$\beta$	1.9060E - 01	57.81%
Tc-98	$\beta,\gamma$	4.4189E - 14	0.00%
Tc-99	$\beta$	3.5972E - 07	0.00%
Te-125m	$\beta,\gamma$	5.6669E - 07	0.00%
Th-227	$\alpha,\beta,\gamma$	5.0385E - 11	0.00%
Th-228	$\alpha,\beta,\gamma$	6.4922E - 06	0.00%
Th-229	$\alpha,\beta,\gamma$	2.1339E - 11	0.00%
Th-230	$\alpha,\beta,\gamma$	1.0843E - 05	0.00%
Th-231	$\beta,\gamma$	6.8896E - 09	0.00%
Th-232	$\alpha,\beta,\gamma$	5.5648E - 05	0.02%
Th-234	$\beta,\gamma$	1.6268E - 06	0.00%
Tl-207	$\beta,\gamma$	0.0000E + 00	0.00%
Tl-208	$\beta,\gamma$	0.0000E + 00	0.00%
Tl-209	$\beta,\gamma$	0.0000E + 00	0.00%
U-232	$\alpha,\beta,\gamma$	6.6850E - 08	0.00%
U-233	$\alpha,\beta,\gamma$	6.4017E - 10	0.00%
U-234	$\alpha,\gamma$	1.5070E - 04	0.05%
U-235	$\alpha,\gamma$	2.7558E - 06	0.00%
U-236	$\alpha,\beta,\gamma$	5.0534E - 06	0.00%
U-238	$\alpha,\beta,\gamma$	4.8805E - 05	0.01%

Table C-4. (continued).

Radionuclide	Radiations Emitted	Dose Rate For Ingestion (mrem/d CEDE)	% of Total Dose Rate
Y-90	$\beta$	7.1491E - 04	0.22%
Zr-93	$\beta$	2.1415E - 07	0.00%
<b>Totals</b>		<b>3.2970E - 01</b>	<b>1.0000E + 00</b>

## **Appendix D**

### **Supplemental Nonradiological Risk Calculations**

Table D-1. Landfill bulldozer operator scenario—potential excess lifetime cancer risk.

Constituent	WOE	SF <sub>d</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>i</sub> (mg/kg-day) <sup>-1</sup>	EPC (mg/kg)	ABS <sub>di</sub>	ABS <sub>si</sub>	Ingestion			Dermal			Inhalation		
							CDI		CDI		CDI		Total ELCR	%	
							(mg/kg-day)	ELCR	(mg/kg-day)	ELCR	(mg/kg-day)	ELCR			
1,1,1-Trichloroethane	D	2.00E-01	2.00E-01	1.57E-02	1	2.08E-09	2.33E-08								
1,1,2,2-Tetrachloroethane	C	5.70E-02	5.70E-02	5.60E-02	1	6.55E-12	1E-12	7.36E-11	1E-11	2E-11	2E-11	0.00	0.00	0.00	
1,1,2-Trichloroethane	C	5.70E-02			1	3.21E-11	2E-12	3.60E-10	2E-11	2E-11					
1,1-Dichloroethane	C	6.00E-01	6.00E-01	1.75E-01	1	3.10E-10		3.48E-09							
1,1-Dichloroethene	C	6.00E-01	6.00E-01	1.48E-03	1	1.96E-10	1E-10	2.20E-09	4E-10	5E-10					
1,2,4-Trichlorobenzene	D			1.14E-02	1	1.51E-09		1.35E-08							
1,2-Dichlorobenzene	D	9.10E-02	9.10E-02	9.10E-02	1	1.51E-09		1.69E-08							
1,2-Dichloroethane	B2			5.38E-06	1	7.13E-13	6E-14	8.00E-12	7E-13	8E-13	8E-13	0.00	0.00	0.00	
1,2-Dichloroethene (total)	D			3.24E-04	1	4.30E-11		4.82E-10							
1,3-Dichlorobenzene	D			1.14E-02	1	1.51E-09		1.69E-08							
1,4-Dichlorobenzene	C	2.40E-02	2.40E-02	2.20E-02	1	5.96E-08	1E-09	6.59E-07	1E-08	2E-08	2E-08	0.2	0.2	0.2	
1,4-Dioxane	B2	1.10E-02	1.10E-02	1.10E-02	1	2.49E-12	3E-14	1.64E-12	2E-14	6.03E-14	7E-16	5E-14	0.00	0.00	
2,4,5-Trichlorophenol	B2	1.10E-02	1.10E-02	1.09E-02	1	4.46E-02	0.10	3.91E-09	3.90E-09	1.43E-10					
2,4,6-Trichlorophenol	B2			1.83E-02	1	2.42E-09	3E-11	1.60E-09	2E-11	5.85E-11					
2,4-Dichlorophenol	B2			2.16E-02	1	2.86E-09		1.89E-09		6.92E-11					
2,4-Dimethylphenol	B2			1.83E-02	1	2.42E-09		1.60E-09		5.85E-11					
2,4-Dinitrophenol	B2			5.09E-02	1	6.75E-09		4.45E-09		1.63E-10					
2,4-Dinitrotoluene	B2			1.14E-02	1	1.51E-09		9.95E-10		3.65E-11					
2,6-Dinitrotoluene	B2			2.07E-02	1	1.74E-09		1.81E-09		6.63E-11					
2-Butanone	D			2.47E-02	1	3.28E-09		2.76E-08							
2-Chloronaphthalene				1.14E-02	1	1.51E-09		1.51E-09		7.07E-09					
2-Chlorophenol				1.83E-02	1	2.42E-09		2.42E-09		2.72E-08					
2-Hexanone				2.70E-03	1	3.57E-10				8.64E-12					
2-Methylphthalene	C			5.12E-01	1	6.78E-08				1.37E-07					
2-Methylphenol	C			2.06E-02	1	2.73E-09		1.80E-09		6.62E-11					
2-Nitroaniline				2.72E-02	1	3.61E-09				4.05E-08					
2-Nitrophenol				1.83E-02	1	2.42E-09		1.60E-09		5.85E-11					
3,3-Dichlorobenzidine	B2	4.50E-01	4.50E-01	4.50E-01	1	1.51E-09	7E-10	9.95E-10	4E-10	3.65E-11	2E-11	1E-09	0.01	0.01	
3-Nitroaniline				2.72E-02	1	3.61E-09		2.39E-09		4.05E-08					
4,6-Dinitro-2-methylphenol				4.46E-02	1	5.91E-09		3.90E-09		1.43E-10					
4-Chloroaniline				4.08E-02	1	5.41E-09		3.57E-09		1.31E-10					
4-Methyl-2-Pentanone				2.96E-02	1	3.93E-09				4.41E-08					
4-Methylphenol	C			3.86E-02	1	5.11E-09		3.37E-09		1.24E-10					
4-Nitroaniline	D			5.16E-02	1	3.61E-09		2.39E-09		4.05E-08					
4-Nitrophenol	D			0.10	1	6.83E-09		4.51E-09		1.65E-10					
Acenaphthene	D			2.02E-01	1	2.68E-08				5.67E-08					
Acenaphthylene	D			2.07E-02	1	2.74E-09				7.81E-09					
Acetone	D			6.20E-01	1	8.22E-08				9.23E-07					
Acetonitrile	C			1.88E-05	1	2.49E-12				2.06E-11					
Acrolein	B1	5.40E-01	5.40E-01	2.38E-01	1	1.20E-12	6E-13			1.35E-11	3E-12	4E-12	0.00	0.00	
Acrylonitrile	D			3.20E-01	1	4.24E-08				2.44E-08					
Anthracene	B2	2.50E-02	2.50E-02	2.49E-02	1	1.52E-11	4E-13	1.00E-11		3.67E-13	9E-15	6E-13	0.00	0.00	
Aramite	B2	7.00E-02	7.00E-02	7.00E-02	1	1.02E-09	7E-11	9.41E-10		2.46E-11	2E-12	1E-10	0.00	0.00	
Aroclor-1016	B2	2.00E+00	2.00E+00	1.28E-01	1	1.70E-08	3E-08	1.57E-08	3E-08	4.12E-10	8E-10	7E-08	0.8	0.8	
Aroclor-1254	B2	2.00E+00	2.00E+00	7.21E-01	1	9.55E-08	2E-07	8.82E-08	2E-07	2.31E-09	5E-09	4E-07	4	4	
Aroclor-1260	B2	2.00E+00	2.00E+00	6.22E-02	1	8.24E-09	2E-08	7.61E-09	2E-08	1.99E-10	4E-10	3E-08	0.4	0.4	
Aroclor-1268	B2	5.50E-02	2.70E-02	6.03E-01	1	7.99E-08	4E-09			8.97E-07	2E-08	3E-08	0.3	0.3	

**Table D-1. Landfill bulldozer operator scenario—potential excess lifetime cancer risk.**

Constituent	WOE	SF <sub>d</sub>	SF <sub>u</sub>	SF <sub>i</sub>	EPC	ABS <sub>d</sub>	CDI	Ingestion			Dermal			Inhalation		
								(mg/kg-day) <sup>-1</sup>	(mg/kg-day) <sup>-1</sup>	(mg/kg/day)	CDI	ELCR	(mg/kg-day)	CDI	ELCR	Total ELCR
Benzidine	A	2.30E+02	2.30E+02	2.30E+02	2.91E-04	0.10	1	3.85E-11	9E-09	6E-09	9.31E-13	2E-10	1E-08			
Benz(a)anthracene	B2	7.30E+01	7.30E+01	3.10E-01	2.53E-01	0.13	1	3.35E-08	2E-08	2.88E-08	8.11E-10	3E-10	5E-08	0.5		
Benz(a)pyrene	B2	7.30E+00	7.30E+00	3.10E+00	1.05E-01	0.13	1	1.39E-08	1E-07	1.19E-08	9E-08	3E-10	1E-09	2.2		
Benz(b)fluoranthene	B2	7.30E+01	7.30E+01	3.10E-01	1.79E-01	0.13	1	2.38E-08	2E-08	2.04E-08	1E-08	5.75E-10	2E-10	3E-08	0.4	
Benz(g,h)perylene	D															
Benz(k)fluoranthene	B2	7.30E-02	7.30E-02	3.10E-02	1.14E-02	0.13	1	1.51E-09	2E-10	2.11E-09	2E-10	5.36E-11	2E-12	3E-10	0.00	
Benzic acid	D															
bis(2-Chloroisopropyl)ether	B2	1.10E+00	1.10E+00	1.16E+00	1.14E-02	0.10	1	1.13E-09	2E-09	7.48E-10	2.74E-11					
bis(2-Ethylhexyl)phthalate	C	7.00E-02	7.00E-02	3.30E-02	1.14E-02	0.10	1	1.51E-09	1E-10	7.19E-09	7.19E-09	1E-08	1E-08	0.1		
Butylbenzylphthalate	B2	1.40E-02	1.40E-02	1.40E-02	1.47E-01	0.10	1	1.93E-08	3E-10	1.29E-08	2E-10	4.72E-10	7E-12	5E-10	0.01	
Carbazole	C															
Carbon Disulfide	B2	2.00E-02	2.00E-02	2.00E-02	4.55E-02	0.10	1	4.29E-09	9E-11	5.94E-09	2.83E-09	6E-11	1E-12	1E-10	0.00	
Chlorobenzene	D															
Chloroethane	C	2.90E-03	2.90E-03	2.90E-03	3.02E-06	0.03	1	4.00E-13	1E-15	4.67E-13	6E-13	4.49E-12	1E-14	1E-14	0.00	
Chloromethane	C	1.30E-02	1.30E-02	6.30E-03	3.53E-04	0.03	1	3.51E-08	3E-10	3.02E-08	2E-10	5.25E-10	3E-12	4E-12	0.00	
Chrysene	B2	7.30E-03	7.30E-03	3.10E-03	2.65E-01	0.13	1	1.51E-09	1E-08	1.29E-09	9E-09	8.30E-10	3E-12	5E-10	0.01	
Dibenz(a,h)anthracene	B2	7.30E+00	7.30E+00	3.10E+00	1.14E-02	0.13	1	1.51E-09	1E-08	1.29E-09	9E-09	3.65E-11	1E-10	2E-08	0.2	
Dibenzofuran	D															
Diethylphthalate	D															
Dimethylphthalate	D															
Di-n-butylphthalate	D															
Di-n-octylphthalate	D															
Ethylbenzene	D															
Famphur	D															
Fluoranthene	D															
Fluorene	B2	1.60E+00	1.60E+00	1.61E+00	1.84E-01	0.13	1	2.43E-08	2E-09	9.95E-10	2E-09	6.61E-11	6E-11	4E-09	0.05	
Hexachlorobenzene	C	7.80E-02	7.80E-02	7.80E-02	2.07E-02	0.10	1	1.51E-09	2E-10	1.81E-09	1E-10	6.63E-11	5E-12	4E-10	0.00	
Hexachlorobutadiene	D															
Hexachlorocyclopentadiene	C	1.40E-02	1.40E-02	1.40E-02	1.14E-02	0.10	1	1.51E-09	2E-11	9.95E-10	1E-11	3.65E-11	5E-13	4E-11	0.00	
Hexachloroethane	C															
Indeno(1,2,3-cd)pyrene	B2	7.30E-01	7.30E-01	3.10E-01	1.14E-02	0.13	1	1.51E-09	1E-09	1.29E-09	9E-10	3.65E-11	1E-11	2E-09	0.02	
Isobutyl alcohol	C															
Isophorone	C	9.50E-04	9.50E-04	9.50E-04	1.14E-02	0.10	1	1.51E-09	1E-12	9.95E-10	9E-13	3.65E-11	3E-14	2E-12	0.00	
Kepone	C	1.80E+01	1.80E+01	1.80E+01	9.92E-02	0.10	1	1.31E-08	2E-07	8.68E-09	2E-07	3.18E-10	6E-09	4E-07	5	
Methylene Chloride	B2	7.50E-03	7.50E-03	1.65E-03	8.36E-02	0.11	1	6.42E-11	1E-11	1.11E-08	8E-11	5.09E-10	1E-10	3E-10	0.00	
Naphthalene	C															
Nitrobenzene	B2	7.00E+00	7.00E+00	7.00E+00	1.14E-02	0.10	1	1.51E-09	1E-08	9.95E-10	7E-09	3.65E-11	3E-10	2E-08	0.2	
N-Nitroso-di-n-propylamine	B2	4.90E-03	4.90E-03	4.90E-03	1.14E-02	0.10	1	1.51E-09	7E-12	9.95E-10	5E-12	3.65E-11	2E-13	1E-11	0.00	
N-Nitrosodiphenylamine	B2	1.20E-01	1.20E-01	1.20E-01	5.59E-02	0.25	1	7.41E-09	9E-10	1.22E-08	1E-09	1.79E-10	2E-11	2E-09	0.03	
Pentachlorophenol	D															
Phenanthrene	D															
Phenol	D															
Pyrene	D															
Styrene	C															
Tetrachloroethene	C-B2	5.20E-02	5.20E-02	2.03E-03	9.64E-03	0.01	1	1.28E-09	7E-11			1.43E-08	3E-11	1E-10	0.00	
Toluene	D															

**Table D-1. Landfill bulldozer operator scenario—potential excess lifetime cancer risk.**

Constituent	WOE	SF <sub>O</sub>	SF <sub>d</sub>	SF <sub>i</sub>	EPC	ABS <sub>d</sub>	CDI	Ingestion		Dermal		Inhalation	
								(mg/kg-day) <sup>-1</sup>	(mg/kg-day) <sup>-1</sup>	CDI	CDI	(mg/kg-day)	ELCR
Trichloroethene	B2	1.10E-02	1.10E-02	6.00E-03	7.20E-02	1	9.55E-09	1E-10	1.07E-07	6E-10	7E-10	0.01	
Xylene (ortho)	D				3.88E-03	0.10	1	5.15E-10		5.78E-09		5.14E-06	
Xylene (total)					3.45E-09	0.10	1	4.58E-07		5.75E-07		2.27E-05	
Aluminum					7.08E-03		1	9.38E-04		9.21E-10		0	
Antimony	D	1.50E+00	1.50E+00	1.51E+01	5.65E+00	0.03	0.15	7.73E-07	1E-06	1.48E-07	2E-07	1.37E-08	
Arsenic	A				1.79E+02		0.07	2.38E-05		5.75E-07		1.31E-08	
Barium	D				8.40E+00	2.87E-01	0.007	3.8E-08		9.21E-10		2E-06	
Beryllium	B1				1.85E+02		1	2.45E-05		5.92E-07		19	
Boron	D				6.30E+00	3.59E+00	0.001	0.05	4.75E-07		1.15E-08		
Cadmium	B1				4.20E+01	4.12E+01		0.025	5.45E-06		1.32E-07		
Chromium	A				6.04E+00	6.04E+00		1	8.00E-07		1.93E-08		
Cobalt					2.99E+01		1	3.96E-06		9.39E-08		6.63E-07	
Copper	D				3.37E+01		1	4.46E-08		1.08E-09		1.08E-09	
Cyanide					5.93E+01		1	7.86E-06		1.90E-07		1.24E-08	
Dysprosium					3.87E+00		1	5.12E-07		1.36E-03		3.28E-05	
Fluoride					1.02E+04		1	1.36E-03		1.93E-08		6.63E-07	
Iron					2.07E+02		0.06	2.74E-05		3.03E-08		3.03E-08	
Manganese	D				9.45E+00		0.07	1.25E-06		1.35E-06		3.26E-08	
Mercury	D				1.02E+01		1	0.04	2.60E-06		6.30E-08		
Molybdenum	D				1.97E+01		0.04	0.04	1.12E-07		2.71E-09		
Nickel	D				8.46E-01		1	0.04	1.30E-06		3.15E-08		
Selenium	D				9.84E+00		0.04	1.30E-06		2.41E-06		5.84E-08	
Silver	D				1.82E+01		1	4.91E-08		1.19E-09		6.31E-08	
Strontrium	D				3.70E+01		1	0.026	2.82E-06		6.67E-07		
Thallium					2.12E+01		1	2.76E-05		8E-07		100	
Vanadium	D				2.08E+02		1						
Zinc													
<b>Estimated Subtotals</b>													
												<b>Estimated Total Risk = 8E-06</b>	

Guide to Appendix D Table Abbreviations:

ABSD = Dermal Absorption Factor

ABSGi = Gastrointestinal Absorption Factor

CDI = Chronic Daily Intake

ELCR = Excess Lifetime Cancer Risk

EPC = Exposure Point Concentration

H1 = hazard index

HQ = hazard quotient

IC = Inhalation Concentration

NA = not available

Rf<sub>c</sub> = Reference Concentration

RFd = Dermal Reference Dose

RFd = Inhalation Reference Dose

RFd = Oral Reference Dose

SF = slope factor

SFd = Dermal Slope Factor

Sfi = Inhalation Slope Factor

SFo = Oral Slope Factor

URF = Inhalation Unit Risk Factor

WOE = Weight of Evidence

Cancer WOE Classifications:

Group A: Human carcinogen.

Group B: Probably human carcinogen.

B1 - indicates that limited human data are available.

B2 - indicates sufficient evidence in animals and inadequate or no evidence in humans.

Group C: Possible human carcinogen.

Group D: Not classifiable.

Table D-2. Landfill bulldozer operator scenario—potential noncarcinogenic risk.

Constituent	Ingestion		Dermal		Inhalation		% Contribution
	RID <sub>a</sub> (mg/kg-day)	RID <sub>d</sub> (mg/kg-day)	RID <sub>i</sub> (mg/kg-day)	EPS (mg/kg)	CDI (mg/kg-day)	HQ (mg/kg-day)	
1,1,1-Trichloroethane	2.00E-02	2.00E-02	2.86E-01	1.57E-02	1.97E-09	4.83E-07	1.09E-07
1,1,2,2-Tetrachloroethane	6.00E-02	6.00E-02	6.00E-02	4.95E-05	1	3.06E-11	5.72E-09
1,1,2-Trichloroethane	4.00E-03	4.00E-03	4.00E-03	2.42E-04	1	1.50E-10	3.74E-08
1,1-Dichloroethane	1.00E-01	1.00E-01	1.43E-01	2.34E-03	1	1.45E-09	1.45E-06
1,1-Dichloroethene	9.00E-03	9.00E-03	9.00E-03	1.48E-03	1	9.15E-10	4.57E-07
1,2,4-Trichlorobenzene	1.00E-02	1.00E-02	5.70E-02	1.14E-02	1	1.02E-07	1.06E-05
1,2-Dichlorobenzene	9.00E-02	9.00E-02	5.71E-02	1.14E-02	1	7.04E-09	1.24E-06
1,2-Dichloroethane	3.00E-02	3.00E-02	1.40E-03	5.38E-06	1	7.82E-08	1.14E-06
1,2-Dichloroethene (total)	1.00E-02	1.00E-02	3.24E-04	2.34E-04	1	3.33E-12	1.11E-10
1,3-Dichlorobenzene	9.00E-04	9.00E-04	9.00E-04	1.14E-02	1	7.04E-09	2.25E-09
1,4-Dichlorobenzene	3.00E-02	3.00E-02	4.50E-01	2.29E-01	1	7.28E-07	2.45E-07
1,4-Dioxane				1.88E-05	0.10	1	1.16E-11
2,4,5-Trichlorophenol	1.00E-01	1.00E-01	1.00E-01	4.46E-02	0.10	1	2.76E-08
2,4,6-Trichlorophenol				1.83E-02	0.10	1	1.33E-08
2,4-Dichlorophenol	3.00E-03	3.00E-03	3.00E-03	2.16E-02	0.10	1	1.34E-08
2,4-Dimethylphenol	2.00E-02	2.00E-02	2.00E-02	1.83E-02	0.10	1	1.13E-08
2,4-Dinitrophenol	2.00E-03	2.00E-03	2.00E-03	5.09E-02	0.10	1	3.15E-08
2,4-Dinitrotoluene	2.00E-03	2.00E-03	2.00E-03	1.14E-02	0.10	1	7.04E-09
2,6-Dinitrotoluene	1.00E-03	1.00E-03	1.00E-03	2.07E-02	0.10	1	1.28E-08
2-Butanone	6.00E-01	6.00E-01	2.86E-01	2.47E-02	1	1.53E-08	2.32E-06
2-Chloronaphthalene	8.00E-02	8.00E-02	8.00E-02	1.14E-02	1	7.04E-09	8.44E-09
2-Chlorophenol	5.00E-03	5.00E-03	5.00E-03	1.83E-02	1	1.13E-08	4.64E-09
2-Hexanone	4.00E-02	4.00E-02	1.40E-03	2.70E-03	1	1.67E-09	2.32E-07
2-Methylnaphthalene	2.00E-02	2.00E-02	5.12E-01	5.12E-01	1	3.17E-07	1.58E-08
2-Methylphenol	5.00E-02	5.00E-02	5.00E-02	2.06E-02	0.10	1	1.28E-08
2-Nitroaniline	5.71E-05	5.71E-05	2.72E-02	1.02E-02	1	1.68E-08	5.52E-07
2-Nitrophenol	8.00E-03	8.00E-03	8.00E-03	1.83E-02	0.10	1	1.13E-08
3,3'-Dichlorobenzidine				1.14E-02	0.10	1	2.26E-06
3-Nitroaniline	5.71E-05	5.71E-05	5.71E-05	2.72E-02	0.10	1	4.17E-08
4,6-Dinitro-2-methylphenol	2.00E-03	2.00E-03	2.00E-03	4.46E-02	0.10	1	1.68E-08
4-Chloroaniline	4.00E-03	4.00E-03	4.00E-03	4.08E-02	0.10	1	2.76E-08
4-Methyl-2-Pentanone	8.00E-02	8.00E-02	2.29E-02	2.96E-02	1	1.83E-08	6.31E-06
4-Methylphenol	5.00E-03	5.00E-03	3.86E-02	0.10	1	2.39E-08	1.57E-08
4-Nitroaniline	5.71E-05	5.71E-05	2.72E-02	0.10	1	1.68E-08	1.94E-04
4-Nitrophenol	8.00E-03	8.00E-03	5.16E-02	0.10	1	3.19E-08	3.99E-06
Acenaphthene	6.00E-02	6.00E-02	2.02E-01	1	1.25E-07	2.10E-08	2.08E-06
Acenaphthylene	6.00E-02	6.00E-02	6.00E-02	2.07E-02	1	1.28E-08	2.29E-07
Acetone	1.00E-01	1.00E-01	1.00E-01	6.20E-01	1	3.84E-07	3.84E-06
Acetonitrile	6.00E-03	6.00E-03	1.70E-02	1.88E-05	1	1.16E-11	1.94E-09
Acrolein	2.00E-02	2.00E-02	5.71E-06	9.06E-06	1	5.60E-12	2.80E-10
Acrylonitrile	1.00E-03	1.00E-03	5.71E-04	9.06E-06	1	5.60E-12	5.60E-09
Anthracene	3.00E-01	3.00E-01	3.20E-01	1.15E-04	0.10	1	1.98E-07
Aramite	5.00E-02	5.00E-02	5.00E-02	1.42E-09	0.10	1	5.72E-07
Acrolein-1016	7.00E-05	7.00E-05	7.69E-03	0.14	1	4.75E-09	4.39E-09
Acrolein-1254	2.00E-05	2.00E-05	1.28E-01	1.28E-01	0.14	1	7.94E-08

a RID = Risk Index; d RID = dermal absorption factor; i RID = inhalation absorption factor; CDI = cancer risk index; HQ = hazard quotient.

Table D-2. Landfill bulldozer operator scenario—potential noncarcinogenic risk.

**Table D-2.** Landfill bulldozer operator scenario—potential noncarcinogenic risk.

Constituent	Ingestion							Dermal			Inhalation	
	RFD <sub>o</sub> (mg/kg-day)	RFD <sub>d</sub> (mg/kg-day)	RFD <sub>j</sub> (mg/kg-day)	EPC (mg/kg)	CDI (mg/kg-day)	HQ	(mg/kg-day)	CDI (mg/kg-day)	HQ	(mg/kg-day)	Total HI Contribution	
Phenanthrene	3.00E-01	3.00E-01	1.17E+00	1.17E+00	1	7.22E-07	2.41E-06	1.75E-08	5.83E-08	2.47E-06	5.69E-04	
Phenol	6.00E-01	6.00E-01	6.00E-01	7.98E-02	0.10	1	4.93E-08	8.22E-08	3.26E-08	5.19E-09	1.38E-07	
Pyrene	3.00E-02	3.00E-02	3.00E-02	2.53E-01	1	1.57E-07	5.22E-06	1.26E-07	3.79E-09	5.35E-06	1.23E-03	
Styrene	2.00E-01	2.00E-01	2.90E-01	1.03E-06	1	6.34E-13	3.17E-12	7.12E-12	2.45E-11	2.77E-11	6.39E-09	
Tetrachloroethene	1.00E-02	1.00E-02	1.14E-01	9.64E-03	1	5.96E-09	5.96E-07	6.69E-08	5.87E-07	1.18E-06	2.73E-04	
Toluene	2.00E-01	2.00E-01	1.10E-01	9.82E-01	1	6.07E-07	3.04E-06	6.82E-06	6.20E-05	6.50E-05	0.015	
Trichloroethylene	6.00E-03	6.00E-03	6.00E-03	7.20E-02	1	4.45E-08	7.42E-06	5.00E-07	8.33E-05	9.08E-05	0.021	
Xylene (ortho)	2.00E+00	2.00E+00	2.00E-01	3.88E-03	0.10	1	2.40E-09	1.20E-09	2.70E-08	1.35E-07	3.14E-05	
Xylene (total)	2.00E+00	2.00E+00	2.00E-01	3.45E+00	0.10	1	2.14E-06	1.07E-06	2.40E-05	1.20E-04	1.21E-04	
Aluminum	1.00E+00	1.00E+00	1.40E-03	7.08E+03	1	4.38E-03	4.38E-03	1.06E-04	0.076	0.080	18	
Antimony	4.00E-04	6.00E-05	5.83E+00	0.15	3.61E-06	0.0090	8.72E-08	0.0090	0.0090	2.08		
Arsenic	3.00E-04	3.00E-04	5.65E+00	0.03	1	3.50E-06	0.0117	6.92E-07	2.31E-03	8.46E-08	0.0140	
Barium	7.00E-02	4.90E-03	1.43E-04	1.79E+02	0.07	1.11E-04	1.59E-03	2.68E-06	0.019	0.020	4.7	
Beryllium	2.00E-03	1.40E-05	5.71E-06	2.87E-01	0.007	1.78E-07	8.88E-05	4.30E-09	7.53E-04	8.42E-04	0.19	
Boron	9.00E-02	9.00E-02	5.71E-03	1.38E+02	1	1.14E-04	1.27E-03	2.76E-06	4.83E-04	0.0018	0.40	
Cadmium	5.00E-04	2.50E-05	3.59E+00	0.001	0.03	2.22E-06	4.43E-03	5.36E-08	0.0056	0.0056	1.29	
Chromium			4.12E+01	0.025	2.55E-05	2.55E-05	6.16E-07	6.16E-07	9.03E-08	6.22E-05	0.0144	
Cobalt	6.00E-02	6.00E-02	6.04E+00	1	3.73E-05	6.22E-05	4.47E-07	4.47E-07	4.98E-04	0.115		
Copper	3.71E-02	3.71E-02	2.99E+01	1	1.85E-05	4.98E-04	5.04E-09	5.04E-09	5.88E-06	1.63E-05	0.0038	
Cyanide	2.00E-02	2.00E-02	8.57E-04	3.37E-01	1	2.08E-07	1.04E-05	8.88E-07	1.83E-04	0.042		
Dysprosium	2.00E-01	2.00E-01	5.93E+01	1	3.67E-05	1.83E-04						
Fluoride	6.00E-02	6.00E-02	3.87E+00	1	2.39E-06	3.98E-05	5.78E-08	5.78E-08	3.98E-05	0.0092		
Iron	3.00E-01	3.00E-01	1.02E+04	1	6.34E-03	0.0211	1.53E-04	1.53E-04	0.0211	4.9		
Manganese	2.40E-02	1.44E-03	1.40E-05	1.02E+02	0.04	1.28E-04	0.0053	3.09E-06	0.22	0.23	52	
Mercury	3.00E-04	2.10E-05	9.45E+00	0.07	5.84E-06	0.0195	1.41E-07	1.41E-07	0.0195	4.5		
Molybdenum	5.00E-03	5.00E-03	1.02E+01	1	6.29E-06	1.26E-03	1.52E-07	1.52E-07	1.26E-03	0.290		
Nickel	2.00E-02	8.00E-04	1.97E+01	0.04	1.22E-05	6.08E-04	2.94E-07	2.94E-07	6.08E-04	0.140		
Selenium	5.00E-03	5.00E-03	8.46E-01	1	5.23E-07	1.05E-04	1.27E-08	1.27E-08	1.05E-04	0.0241		
Silver	5.00E-03	2.00E-04	9.84E+00	0.04	6.08E-06	1.22E-03	1.47E-07	1.47E-07	1.22E-03	0.281		
Strontium	6.00E-01	6.00E-01	1.82E+01	1	1.13E-05	1.88E-05	2.72E-07	2.72E-07	1.88E-05	0.0043		
Thallium	6.50E-05	6.60E-05	3.70E-01	1	2.29E-07	3.47E-03	5.54E-09	5.54E-09	3.47E-03	0.80		
Vanadium	7.00E-03	1.82E-04	2.12E+01	0.026	1.31E-05	1.88E-03	3.18E-07	3.18E-07	1.88E-03	0.43		
Zinc	3.00E-01	3.00E-01	2.08E+02	1	1.29E-04	4.29E-04	3.11E-06	3.11E-06	4.29E-04	0.099	100	
<b>Subtotal Hazard Indices</b>					0.093	0.0071			0.33			
										Total HI =	0.43	

Guide to Appendix D Table Abbreviations:

ABSD = Dermal Absorption Factor

SF = slope factor  
SF<sub>d</sub> = Dermal Slope Factor  
SF<sub>i</sub> = Inhalation Slope Factor

ELCR = Excess Lifetime Cancer Risk

**Table D-2. Landfill bulldozer operator scenario—potential noncarcinogenic risk.**

Constituent	EPC = Exposure Point Concentration (mg/kg-day)	RfD <sub>o</sub> (mg/kg-day)	RfD <sub>d</sub> (mg/kg-day)	RfD <sub>i</sub> (mg/kg-day)	EPC (mg/kg)	ABS <sub>d</sub> (mg/kg-day)	ABS <sub>i</sub> (mg/kg-day)	Ingestion		Dermal		Inhalation	
								CDI	HQ	CDI	HQ	CDI	HQ
<b>URF = Inhalation Unit Risk Factor</b>													
WOE = Weight of Evidence													
Cancer WOE Classifications:													
Group A: Human carcinogen.													
Group B: Probably human carcinogen.													
B1 - indicates that limited human data are available.													
B2 - indicates sufficient evidence in animals and inadequate or no evidence in humans.													
Group C: Possible human carcinogen.													
Group D: Not classifiable.													

RfC = Reference Concentration  
RfD<sub>d</sub> = Dermal Reference Dose  
RfD<sub>i</sub> = Inhalation Reference Dose  
RfDo = Oral Reference Dose

NA = not available

IC = Inhalation Concentration

HQ = hazard quotient

HI = hazard index

EPC = Exposure Point Concentration

URF = Inhalation Unit Risk Factor

WOE = Weight of Evidence

Cancer WOE Classifications:

Group A: Human carcinogen.

Group B: Probably human carcinogen.

B1 - indicates that limited human data are available.

B2 - indicates sufficient evidence in animals and inadequate or no evidence in humans.

Group C: Possible human carcinogen.

Group D: Not classifiable.

**Table D-3. Treatment unit operator scenario—potential excess lifetime cancer risk.**

Constituent	WOE (mg/kg-day) <sup>j</sup>	SF <sub>d</sub> (mg/kg-day) <sup>j</sup>	SF <sub>f</sub> (mg/kg-day) <sup>j</sup>	EPC (mg/kg)	Ingestion		Dermal		Inhalation	
					CDI	ABS <sub>d</sub> (mg/kg-day)	CDI	ELCR (mg/kg-day)	CDI	ELCR (mg/kg-day)
1,1,1-Trichloroethane	D	2.00E-01	2.00E-01	2.03E-01	6.35E-02	1	1.07E-08	1.20E-07	1	1.20E-07
1,1,2,2-Tetrachloroethane	C	5.70E-02	5.70E-02	5.60E-02		1				
1,1,2-Trichloroethane	C					1				
1,1-Dichloroethane	C	6.00E-01	6.00E-01	1.75E-01		1				
1,1,2,4-Tetrachlorobenzene	D					1				
1,2-Dichlorobenzene	D					1				
1,2-Dichloroethane	B2	9.10E-02	9.10E-02	9.10E-02	3.13E-04	1	5.25E-11			
1,2-Dichloroethylene (total)	D					1				
1,3-Dichlorobenzene	C	2.40E-02	2.40E-02	2.20E-02		1				
1,4-Dichlorobenzene	B2	1.10E-02	1.10E-02	1.10E-02	0.10	1	3.76E-09	2E-11	9.11E-11	3E-11
1,4-Dioxane						1	1.49E-09		3.60E-11	0.00
2,4,5-Trichlorophenol	B2	1.10E-02	1.10E-02	1.09E-02	2.24E-02	1	8.87E-03	2E-11	9.82E-10	1E-11
2,4,6-Trichlorophenol	B2					1	8.87E-03	0.10	1.49E-09	9.82E-10
2,4-Dimethylphenol						1	2.24E-02	0.10	3.76E-09	2.48E-09
2,4-Dinitrophenol	B2					1	1.20E-02	0.10	2.01E-09	4.87E-11
2,4-Dinitrotoluene	B2					1	5.22E-05	0.10	8.75E-12	7.37E-11
2,6-Dinitrotoluene	D					1				
2-Butanone						1	8.87E-03	0.10	1.49E-09	1.67E-08
2-Chloronaphthalene						1				
2-Chlorophenol						1	8.87E-03	0.10	1.49E-09	9.82E-10
2-Hexanone						1				
2-Methylphthalene						1	8.87E-03	0.10	1.49E-09	3.60E-11
2-Methylphenol	C					1	8.87E-03	0.10	1.49E-09	3.60E-11
2-Nitroaniline						1				
2-Nitrophenol						1	8.87E-03	0.10	1.49E-09	9.82E-10
3,3'-Dichlorobenzidine	B2	4.50E-01	4.50E-01	4.50E-01		1				
3-Nitroaniline						1	2.24E-02	0.10	1.76E-09	2.48E-09
4,6-Dinitro-2-methylphenol						1				
4-Chloroaniline						1	1.08E-01	0.10	1.81E-08	2.03E-07
4-Methyl-2-Pentanone						1	8.87E-03	0.10	1.49E-09	9.82E-10
4-Methylphenol	C					1	2.24E-02	0.10	1.76E-09	9.11E-11
4-Nitroaniline						1				
4-Nitrophenol	D					1	1.20E-02	0.10	2.48E-09	9.11E-11
Acenaphthene	D					1	1.20E-02	0.10	2.01E-09	5.73E-09
Acenaphthylene	D					1	1.86E+00	0.10	3.12E-07	3.50E-06
Acetone	D					1				
Acetonitrile						1				
Acrofin	C	5.40E-01	5.40E-01	2.38E-01		1				
Acrylonitrile	B1					1				
Anthracene	D					1				
Aramite	B2	2.50E-02	2.50E-02	2.49E-02		1	0.10			
Aroclor-1016	B2	7.00E-02	7.00E-02	7.00E-02	9.91E-03	1	1.66E-09	1E-10	1.54E-09	4.02E-11
Aroclor-1234	B2	2.00E+00	2.00E+00	2.00E+00	7.31E-02	1	0.14		1.13E-08	2.96E-10
Aroclor-1260	B2	2.00E+00	2.00E+00	2.00E+00	0.00	1	0.14		1.22E-10	5E-08
Aroclor-1268	A	5.50E-02	5.50E-02	5.50E-02	3.01E-02	1	0.14		4.67E-09	4.86E-06
Benzene	A	2.30E+02	2.30E+02	2.30E+02	2.58E-00	1	0.10		3.43E-07	2E-07
Benzidine						1				1

**Table D-3. Treatment unit operator scenario—potential excess lifetime cancer risk.**

Constituent	WOE <sup>a</sup> (mg/kg-day) <sup>b</sup>	Sf <sub>O</sub> (mg/kg-day) <sup>b</sup>	SF <sub>d</sub> (mg/kg-day) <sup>b</sup>	Sf <sub>I</sub> (mg/kg-day) <sup>b</sup>	EPC (mg/kg)	ABS <sub>d</sub> (mg/kg)	Ingestion		Dermal		Inhalation	
							CDI (mg/kg-day)	ELCR (mg/kg-day)	CDI (mg/kg-day)	ELCR (mg/kg-day)	CDI (mg/kg-day)	ELCR (mg/kg-day)
Benz(a)anthracene	B2	7.30E-01	7.30E-01	3.10E-01	0.13	1						
Benz(a)pyrene	B2	7.30E+00	7.30E+00	3.10E+00	0.13	1						
Benzofluoranthene	B2	7.30E-01	7.30E-01	3.10E-01	0.13	1						
Benz(o,g,h,i)perylene	D											
Benzofluoranthene	B2	7.30E-02	7.30E-02	3.10E-02	0.13	1						
Benzoic acid	D	1.10E+00	1.10E+00	1.16E+00	0.10	1						
bis(2-Chloroethyl)ether	B2	7.00E-02	7.00E-02	3.50E-02	0.10	1						
bis(2-Chloroisopropyl)ether	C	1.40E-02	1.40E-02	1.40E-02	0.39E-05	1						
Butylbenzylphthalate	C											
Carbazole	B2	2.00E-02	2.00E-02	2.00E-02	9.39E-05	1						
Carbon Disulfide												
Chlorobenzene	D											
Chloroethane	C	2.90E-03	2.90E-03	2.90E-03	6.30E-03	1						
Chloroethane	C	1.30E-02	1.30E-02	3.10E-03	0.13	1						
Chrysene	B2	7.30E-03	7.30E-03	3.10E-03	0.13	1						
Dibenzo(a,h)anthracene	B2	7.30E+00	7.30E+00	3.10E+00	0.13	1						
Dibenzofuran	D											
Dichlrophthalate	D											
Dimethylphthalate	D											
Di-n-butylphthalate	D											
Di-n-octylphthalate	D											
Ethylbenzene	D											
Famphur												
Fluoranthene	D											
Fluorene	D											
Hexachlorobenzene	B2	1.60E+00	1.60E+00	1.61E+00	0.10	1						
Hexachlorobutadiene	C	7.80E-02	7.80E-02	7.80E-02	1.20E-03	1						
Hexachlorocyclopentadiene	D											
Hexachloroethane	C	1.40E-02	1.40E-02	1.40E-02	0.10	1						
Indeno[1,2,3-cd]pyrene	B2	7.30E-01	7.30E-01	3.10E-01	0.13	1						
Isobutyl alcohol												
Isophorone	C	9.50E-04	9.50E-04	9.50E-04	0.10	1						
Kepone	C	1.80E-01	1.80E-01	1.80E-01	0.10	1						
Methyl Acetate												
Methylene Chloride	B2	7.50E-03	7.50E-03	1.65E-03	0.10	1						
Naphthalene	C											
Nitrobenzene	B2	7.00E+00	7.00E+00	7.00E+00	0.10	1						
N-Nitroso-di-n-propylamine	B2	4.90E-03	4.90E-03	4.90E-03	0.10	1						
N-Nitrosodiphenylamine	B2	1.20E-01	1.20E-01	1.20E-01	2.24E-03	0.25	1					
Penachlorophenol	D											
Phenanthrene	D											
Phenol	D											
Pyrene	D											
Syrene	C											
Tetrachloroethene	C-B2	5.20E-02	5.20E-02	2.03E-03	2.49E-03	1						
Toluene	D											
Trichloroethene	B2	1.10E-02	1.10E-02	6.00E-03	2.65E-02	1						
Xylene (ortho)												

**Table D-3. Treatment unit operator scenario—potential excess lifetime cancer risk.**

Constituent	WOE (mg/kg-day) <sup>1</sup>	SF <sub>D</sub> (mg/kg-day) <sup>1</sup>	SF <sub>I</sub> (mg/kg-day) <sup>1</sup>	SF <sub>G</sub> (mg/kg-day) <sup>1</sup>	Ingestion			Dermal			Inhalation			
					EPC (mg/kg)	ABS <sub>D</sub> (mg/kg-day)	ABS <sub>I</sub> (mg/kg-day)	CDI (mg/kg-day)	ELCR	CDI (mg/kg-day)	ELCR	CDI (mg/kg-day)	ELCR	Total ELCR
<b>Xylene (total)</b>													1.90E-06	
Aluminum	D	1.01E+00	1.15E-04	1.01E+00	1.01E+00	1	1.70E-07	1	1.93E-03	1	1.93E-03	1	4.68E-05	
Antimony	D	1.50E+00	1.50E+00	1.51E+01	5.74E-02	0.15	9.63E-09	1	2.23E-06	3E-06	4.41E-07	7E-07	2.33E-10	
Arsenic	A	1.92E+02	1.33E+01	0.03	1	0.07	3.21E-05	0.007	1.78E-07	7.77E-07	4.30E-09	4E-08	4E-08	
Barium	D	B1	8.40E+00	1.06E+00	1.92E+02	0.07	3.21E-05	0.007	1.02E-04	1	2.48E-06	5.37E-09	3E-08	
Beryllium	D	B1	6.10E+02	6.30E+00	0.001	0.05	2.22E-07	1.47E-09	1.48E-07	6E-06	1.48E-07	6E-06	0.3	
Boron	B1	A	4.20E+01	3.64E+01	0.025	0.025	6.10E-06	1	1.86E-06	1	4.51E-08	1.39E-07	55	
Cadmium	D	Cobalt	1.11E+01	3.41E+01	0.025	0.025	1.86E-06	1	5.73E-06	1	1.86E-06	1	5.04E-08	
Chromium	D	Cyanide	1	1	1	1	1	1	1	1	1	1	9.24E-05	
Dysprosium	D	Fluoride	1.24E+01	2.28E+04	0.01	0.01	2.08E-06	1	3.82E-03	1	6.95E-05	1.68E-06	1.01E-08	
Iron	D	Manganese	4.14E+02	4.14E+02	0.06	0.06	4.19E-07	0.07	1.63E-06	1	1.71E-07	8.82E-09	4.00E-09	
Mercury	D	Molybdenum	2.50E+00	3.37E+01	1	1	5.65E-06	0.04	7.07E-06	1	1.71E-07	3.28E-11	1.86E-07	
Nickel	D	Nickel	4.21E+01	2.17E+00	0.04	0.04	3.64E-07	0.04	1.65E-07	1	1.71E-07	1.86E-07	1.86E-07	
Selenium	D	Silver	9.86E+01	9.86E+01	0.04	0.04	1	1.36E-09	1	1.36E-09	1	1.36E-09	1	1.36E-09
Strontium	D	Thallium	8.09E+03	4.59E+01	0.026	0.026	7.69E-06	1	1.99E-05	1	1.99E-05	4.82E-07	100	
Vanadium	D	Zinc	1.19E+02	1.19E+02	1	1	1	1	1	1	1	1	1	
<b>Estimated Subtotals</b>					3E-06		3E-06		7E-07	7E-06	7E-06	1E-05		

Guide to Appendix D Table Abbreviations:

- ABSD = Dermal Absorption Factor
- ABSG = Gastrointestinal Absorption Factor
- CDI = Chronic Daily Intake
- ELCR = Excess Lifetime Cancer Risk
- EPC = Exposure Point Concentration
- HI = hazard index
- HQ = hazard quotient
- IC = Inhalation Concentration
- NA = not available
- Rf<sub>C</sub> = Reference Concentration
- RIDd = Dermal Reference Dose
- RIDi = Inhalation Reference Dose
- RIDo = Oral Reference Dose
- SF = slope factor
- SFD = Dermal Slope Factor
- SFI = Inhalation Slope Factor
- SFO = Oral Slope Factor
- URF = Inhalation Unit Risk Factor
- WOE = Weight of Evidence
- Cancer WOE Classifications:
  - Group A: Human carcinogen
  - Group B: Probably human carcinogen.
  - B1 - indicates that limited human data are available.
  - B2 - indicates sufficient evidence in animals and inadequate or no evidence in humans.
  - Group C: Possible human carcinogen.
  - Group D: Not classifiable.

Table D-4. Treatment unit operator scenario—potential noncarcinogenic risk.

Constituent	RfD <sub>a</sub> (mg/kg-day)	RfD <sub>d</sub> (mg/kg-day)	RfD <sub>i</sub> (mg/kg-day)	Ingestion			Dermal			Inhalation		
				EPC (mg/kg)	ABS <sub>a</sub>	CDI (mg/kg-day)	CDI			HQ	(mg/kg-day)	CDI (mg/kg-day)
							CDI (mg/kg-day)	HQ	(mg/kg-day)			
1,1,1-Trichloroethane	2.00E-02	2.00E-02	2.86E-01	6.35E-02	1	4.97E-08	2.49E-06			5.58E-07	1.95E-06	4.44E-06
1,1,2,2-Tetrachloroethane	6.00E-02	6.00E-02	6.00E-02		1							4.82E-04
1,1,2-Trichloroethane	4.00E-03	4.00E-03	4.00E-03									
1,1-Dichloroethane	1.00E-01	1.00E-01	1.43E-01									
1,1-Dichloroethene	9.00E-03	9.00E-03	9.00E-03									
1,2,4-Trichlorobenzene	1.00E-02	1.00E-02	5.70E-02									
1,2-Dichlorobenzene	9.00E-02	9.00E-02	5.71E-02									
1,2-Dichloroethane	3.00E-02	3.00E-02	1.40E-03									
1,2-Dichloroethene (total)	1.00E-02	1.00E-02	1.00E-02	3.13E-04		1	2.43E-10	2.45E-08		2.75E-09	2.75E-07	3.00E-07
1,3-Dichlorobenzene	9.00E-04	9.00E-04	9.00E-04									3.25E-05
1,4-Dichlorobenzene	3.00E-02	3.00E-02	2.29E-01									
1,4-Dioxane												
2,4,5-Trichlorophenol	1.00E-01	1.00E-01	1.00E-01	2.24E-02	0.10	1	1.76E-08	1.76E-07	1.16E-08	4.25E-10	4.25E-09	2.96E-07
2,4,6-Trichlorophenol				8.87E-03	0.10	1	6.94E-09	4.58E-09	1.68E-10			3.21E-05
2,4-Dichlorophenol	3.00E-03	3.00E-03	3.00E-03	0.10	1							
2,4-Dimethylphenol	2.00E-02	2.00E-02	2.00E-02	8.87E-03	0.10	1	6.94E-09	3.47E-07	4.58E-09	8.78E-06	1.16E-08	5.80E-06
2,4-Dinitrophenol	2.00E-03	2.00E-03	2.00E-03	2.24E-02	0.10	1	1.76E-08	8.78E-06	1.16E-08	4.23E-10	2.12E-07	1.48E-05
2,4-Dinitrotoluene	2.00E-03	2.00E-03	2.00E-03									1.60E-03
2,6-Dinitrotoluene	1.00E-03	1.00E-03	1.00E-03	1.20E-02	0.10	1	9.39E-09	9.39E-06	6.20E-09	2.27E-10	2.27E-07	1.58E-05
2-Butanone	6.00E-01	6.00E-01	2.86E-01	5.22E-05	1	4.08E-11	6.81E-11			3.44E-10	1.20E-09	1.27E-09
2-Chloronaphthalene	8.00E-02	8.00E-02	8.00E-02	8.87E-03	1					7.79E-08	1.56E-05	1.70E-05
2-Chlorophenol	5.00E-03	5.00E-03	5.00E-03	8.87E-03	1	6.94E-09	1.39E-06					0.0018
2-Hexanone	4.00E-02	4.00E-02	1.40E-03									
2-Methylnaphthalene	2.00E-02	2.00E-02	5.00E-02	8.87E-03	1	6.94E-09	1.39E-07					
2-Methylphenol	5.00E-02	5.00E-02	5.71E-05	5.71E-05	1	6.94E-09	4.58E-09	9.17E-08				
2-Nitroaniline	8.00E-03	8.00E-03	8.00E-03	8.87E-03	0.10	1	6.94E-09	8.68E-07	4.58E-09	5.73E-07		
3,3'-Dichlorobenzidine												
3-Nitroaniline	5.71E-05	5.71E-05	5.71E-05	0.10	1	6.94E-09	4.58E-09	9.17E-08	1.68E-10			
4,6-Dinitro-2-methylphenol	2.00E-03	2.00E-03	2.00E-03	2.24E-02	0.10	1	1.76E-08	8.78E-06	1.16E-08	4.25E-10	2.12E-07	1.48E-05
4-Chloraniline	4.00E-03	4.00E-03	4.00E-03	0.10	1							1.60E-03
4-Methyl-2-Pentanone	8.00E-02	8.00E-02	2.29E-02	1.08E-01	1	8.43E-08	1.05E-06			9.46E-07	4.14E-05	4.24E-05
4-Methylphenol	5.00E-03	5.00E-03	5.00E-03	8.87E-03	0.10	1	6.94E-09	1.39E-06	4.58E-09	9.17E-07	1.68E-10	3.36E-08
4-Nitroaniline	5.71E-05	5.71E-05	5.71E-05	0.10	1							2.54E-04
4-Nitrophenol	8.00E-03	8.00E-03	8.00E-03	2.24E-02	0.10	1	1.76E-08	2.20E-06	1.16E-08	4.25E-10	5.31E-08	3.70E-06
Acenaphthene	6.00E-02	6.00E-02	6.00E-02									
Acenaphthylene	6.00E-02	6.00E-02	6.00E-02	1.00E-01	1.00E-01	1	9.39E-09	1.57E-07		2.68E-08	4.46E-07	6.03E-07
Acetone	1.00E-01	1.00E-01	1.00E-01	1.86E+00	1	1.45E-06	1.45E-05			1.63E-05	1.63E-04	1.78E-04
Acetonitrile	6.00E-03	6.00E-03	6.00E-03	1.70E-02								
Acrolein	2.00E-02	2.00E-02	5.71E-06									
Acrylonitrile	1.00E-03	1.00E-03	5.71E-04									
Anthracene	3.00E-01	3.00E-01	3.00E-01									
Aramite	5.00E-02	5.00E-02	5.00E-02							0.10		

Table D-4. Treatment unit operator scenario—potential noncarcinogenic risk.

Constituent	RfD <sub>a</sub> (mg/kg-day)	RfD <sub>d</sub> (mg/kg-day)	RfD <sub>i</sub> (mg/kg-day)	EPC (mg/kg)	ABS <sub>d</sub> (mg/kg-day)	ABS <sub>i</sub> (mg/kg-day)	Ingestion		Dermal		Inhalation			
							CDI	HQ	CDI	HQ	CDI	HQ		
Aroclor-1016	7.00E-05	7.00E-05	7.00E-05	9.91E-03	0.14	1	7.76E-09	1.11E-04	7.17E-09	1.02E-04	1.88E-10	2.68E-06		
Aroclor-1234	2.00E-05	2.00E-05	2.00E-05	2.00E-05	7.31E-02	0.14	1	5.72E-08	2.86E-03	5.28E-08	0.0026	1.38E-09	6.92E-05	
Aroclor-1260													0.0056	
Aroclor-1268													0.60	
Benzene	3.00E-03	3.00E-03	1.71E-03	3.01E-02	2.58E+00	1	2.36E-08		2.18E-08		5.71E-10			
Benzidine	3.00E-03	3.00E-03	3.00E-03	3.00E-03	0.10	1	2.02E-06	6.73E-04			2.27E-05	0.013	0.014	
Benz(a)anthracene													1.5	
Benz(a)apyrene														
Benz(b)fluoranthene														
Benz(g,h,i)perylene														
Benz(k)fluoranthene														
Benzoic acid	4.00E+00	4.00E+00	4.00E+00	4.00E+00	0.10	1	7.35E-11	3.68E-09	4.85E-11	2.43E-09	1.78E-12	8.09E-11	6.18E-09	
bis(2-Chloroethyl)ether	4.00E-02	4.00E-02	4.00E-02	2.20E-02	9.39E-05	0.10	1	7.35E-11	3.68E-09	4.85E-11	2.43E-09	1.78E-12	8.09E-11	6.18E-09
bis(2-Chloroisopropyl)ether	2.00E-02	2.00E-02	2.00E-01	2.00E-01	0.10	1	7.35E-11	3.68E-09	4.85E-11	2.43E-09	1.78E-12	8.09E-11	6.18E-09	
bis(2-Ethylhexyl)phthalate	2.00E-01	2.00E-01	2.00E-01	2.00E-01	0.10	1	7.35E-11	3.68E-09	4.85E-11	2.43E-09	1.78E-12	8.09E-11	6.18E-09	
Butylbenzylphthalate														
Carbazole														
Carbon Disulfide	1.00E-01	1.00E-01	2.00E-01	2.00E-01	0.10	1	7.35E-11	3.68E-09	4.85E-11	2.43E-09	1.78E-12	8.09E-11	6.18E-09	
Chlorobenzene	2.00E-02	2.00E-02	1.70E-02	1.82E-02	0.10	1	7.35E-11	3.68E-09	4.85E-11	2.43E-09	1.78E-12	8.09E-11	6.18E-09	
Chloroethane	4.00E-01	4.00E-01	2.86E+00	3.60E-02	0.10	1	7.35E-11	3.68E-09	4.85E-11	2.43E-09	1.78E-12	8.09E-11	6.18E-09	
Chloromethane														
Chrysene														
Dibenz(a,h)anthracene														
Dibenzo furan														
Diethyl phthalate														
Dimethyl phthalate	8.00E-01	8.00E-01	8.00E-01	8.00E-01	0.10	1	5.92E-10	5.92E-09	3.91E-10	3.91E-09	1.43E-11	1.43E-10	1.08E-06	
Di-n-butyl phthalate	1.00E+01	1.00E+01	1.00E+01	1.00E+01	0.10	1	7.15E-10	3.57E-08	4.72E-10	2.36E-08	1.73E-11	8.65E-10	6.53E-06	
Di-n-octyl phthalate	1.00E-01	2.00E-02	2.00E-02	2.00E-02	0.10	1	7.15E-10	3.57E-08	4.72E-10	2.36E-08	1.73E-11	8.65E-10	6.53E-06	
Ethylbenzene	1.00E-01	1.00E-01	2.90E-01	2.90E-01	0.10	1	7.15E-10	3.57E-08	4.72E-10	2.36E-08	1.73E-11	8.65E-10	6.53E-06	
Famphur														
Fluoranthene	4.00E-02	4.00E-02	4.00E-02	4.00E-02	0.13	1	5.92E-10	5.92E-09	3.91E-10	3.91E-09	1.43E-11	1.43E-10	1.08E-06	
Fluorene	4.00E-02	4.00E-02	4.00E-02	4.00E-02	0.13	1	5.92E-10	5.92E-09	3.91E-10	3.91E-09	1.43E-11	1.43E-10	1.08E-06	
Hexachlorobenzene	8.00E-04	8.00E-04	8.00E-04	8.00E-04	0.10	1	9.39E-10	3.13E-06	6.20E-10	2.07E-06	2.27E-11	7.58E-08	5.27E-06	
Hexachlorobutadiene	3.00E-04	3.00E-04	3.00E-04	3.00E-04	0.10	1	9.39E-10	3.13E-06	6.20E-10	2.07E-06	2.27E-11	7.58E-08	5.27E-06	
Hexachlorocyclopentadiene	7.00E-03	7.00E-03	7.00E-03	7.00E-03	0.10	1	9.39E-10	3.13E-06	6.20E-10	2.07E-06	2.27E-11	7.58E-08	5.27E-06	
Indeno(1,2,3-cd)pyrene	1.00E-03	1.00E-03	1.00E-03	1.00E-03	0.10	1	9.39E-10	3.13E-06	6.20E-10	2.07E-06	2.27E-11	7.58E-08	5.27E-06	
Isobutyl alcohol	3.00E-01	3.00E-01	3.00E-01	3.00E-01	0.13	1	9.39E-10	3.13E-06	6.20E-10	2.07E-06	2.27E-11	7.58E-08	5.27E-06	
Isophorone	2.00E-01	2.00E-01	2.00E-01	2.00E-01	0.10	1	9.39E-10	3.13E-06	6.20E-10	2.07E-06	2.27E-11	7.58E-08	5.27E-06	
Kepone														
Methyl Acetate	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.10	1	9.39E-10	3.13E-06	6.20E-10	2.07E-06	2.27E-11	7.58E-08	5.27E-06	
Methylene Chloride	6.00E-02	6.00E-02	6.00E-02	6.00E-02	0.10	1	9.39E-10	3.13E-06	6.20E-10	2.07E-06	2.27E-11	7.58E-08	5.27E-06	
Naphthalene	2.00E-02	2.00E-02	2.00E-02	2.00E-02	0.10	1	9.39E-10	3.13E-06	6.20E-10	2.07E-06	2.27E-11	7.58E-08	5.27E-06	

Table D-4. Treatment unit operator scenario—potential noncarcinogenic risk

Constituent	RfD <sub>a</sub> (mg/kg-day)	RfD <sub>d</sub> (mg/kg-day)	RfD <sub>i</sub> (mg/kg-day)	EPC (mg/kg)	ABS <sub>d</sub>	ABS <sub>ui</sub>	Ingestion			Dermal			Inhalation		
							CDI		HQ	CDI		HQ	CDI		HQ
							CDI	(mg/kg-day)		(mg/kg-day)	(mg/kg-day)		(mg/kg-day)	(mg/kg-day)	
Nitrobenzene	5.00E-04	5.00E-04	5.71E-04	1	1	1	1	1		1	1		1	1	
N-Nitroso-di-n-propylamine															
N-Nitrosodiphenylamine	3.00E-02	3.00E-02	3.00E-02	2.24E-03	0.10	1	1	1		1	1		1	1	
Pentachlorophenol	3.00E-01	3.00E-01	3.00E-01	0.25	1	1	1	1		1	1		1	1	
Phenanthrene	6.00E-01	6.00E-01	6.00E-01	8.87E-04	0.10	1	1	1		1	1		1	1	
Phenol															
Pyrene	3.00E-02	3.00E-02	3.00E-02	2.90E-01	1	1	1	1		1	1		1	1	
Styrene	2.00E-01	2.00E-01	1.14E-01	2.49E-03	1	1	1	1		1	1		1	1	
Tetrachloroethene	1.00E-02	1.00E-02	1.10E-01	3.59E-01	1	1	1	1		1	1		1	1	
Toluene	2.00E-01	2.00E-01	6.00E-03	6.65E-02	1	1	1	1		1	1		1	1	
Trichloroethene	6.00E-03	6.00E-03	2.00E+00	1.39E-03	1	1	1	1		1	1		1	1	
Xylene (ortho)	2.00E+00	2.00E+00	2.00E+00	1.01E+00	1	1	1	1		1	1		1	1	
Xylene (total)	2.00E+00	2.00E+00	1.00E+00	1.40E-03	1	1	1	1		1	1		1	1	
Aluminum															
Antimony	4.00E-04	6.00E-05	5.74E-02	0.15	1	1	1	1		1	1		1	1	
Arsenic	3.00E-04	3.00E-04	1.33E+01	0.03	1	1	1	1		1	1		1	1	
Barium	7.00E-02	4.90E-03	1.43E-04	1.92E+02	0.07	1	1	1		1	1		1	1	
Beryllium	2.00E-03	1.40E-05	5.71E-06	1.06E+00	0.007	1	1	1		1	1		1	1	
Boron	9.00E-02	9.00E-02	5.71E-03	6.10E+02	1	1	1	1		1	1		1	1	
Cadmium	5.00E-04	2.50E-05	1.32E+00	0.001	0.025	1	1	1		1	1		1	1	
Chromium															
Cobalt	6.00E-02	6.00E-02	1.11E+01	3.64E+01	0.025	1	1	1		1	1		1	1	
Copper	3.71E-02	3.71E-02	3.41E-01	2.00E-02	8.57E-04	1	1	1		1	1		1	1	
Cyanide															
Dysprosium	2.00E-01	2.00E-01	1.24E+01	1	1	1	1	1		1	1		1	1	
Fluoride	6.00E-02	6.00E-02	2.28E-04	1	1	1	1	1		1	1		1	1	
Iron	3.00E-01	3.00E-01	1.44E-03	4.14E-02	0.04	1	1	1		1	1		1	1	
Manganese	2.40E-02	2.10E-05	2.50E-00	0.07	1	1	1	1		1	1		1	1	
Mercury	3.00E-04	2.17E+00	3.37E-01	1	1	1	1	1		1	1		1	1	
Molybdenum	5.00E-03	8.00E-04	4.21E-01	0.04	1	1	1	1		1	1		1	1	
Nickel	2.00E-02	5.00E-03	2.17E+00	9.86E-01	0.04	1	1	1		1	1		1	1	
Selenium															
Silver	5.00E-03	2.00E-04	9.86E-01	1	1	1	1	1		1	1		1	1	
Strontium	6.00E-01	6.00E-01	8.09E-03	1	1	1	1	1		1	1		1	1	
Thallium	6.60E-05	6.60E-05	4.59E-01	0.026	1	1	1	1		1	1		1	1	
Vanadium	7.00E-03	1.82E-04	1.19E-01	1.19E-02	1	1	1	1		1	1		1	1	
Zinc	3.00E-01	3.00E-01													
<b>Subtotal Hazard Indices</b>									0.151		0.0099		0.76		
													<b>Total HI = 0.92</b>		

Guide to Appendix D Table Abbreviations:

**Table D-4. Treatment unit operator scenario—potential noncarcinogenic risk.**

Constituent	RfD <sub>o</sub> (mg/kg-day)	RfD <sub>d</sub> (mg/kg-day)	RfD <sub>i</sub> (mg/kg-day)	EPC (mg/kg)	Ingestion			Dermal			Inhalation		
					CDI (ng/kg-day)	ABS <sub>d</sub> (ng/kg-day)	ABS <sub>i</sub> (ng/kg-day)	CDI (ng/kg-day)	CDI (mg/kg-day)	HQ (mg/kg-day)	CDI (ng/kg-day)	CDI (mg/kg-day)	HQ (mg/kg-day)
<b>ABS<sub>d</sub> = Dermal Absorption Factor</b>													
ABSgi = Gastrointestinal Absorption Factor	SF = slope factor	SFd = Dermal Slope Factor	Sfi = Inhalation Slope Factor	SFo = Oral Slope Factor	URF = Inhalation Unit Risk Factor	WOE = Weight of Evidence	Cancer WOE Classifications:	Group A: Human carcinogen.	Group B: Probably human carcinogen.	Group C: Possible human carcinogen.	Group D: Not classifiable.		
CDI = Chronic Daily Intake					B1 - indicates that limited human data are available.								
ELCR = Excess Lifetime Cancer Risk					B2 - indicates sufficient evidence in animals and inadequate or no evidence in humans.								
EPC = Exposure Point Concentration													
HI = hazard index													
HQ = hazard quotient													
IC = Inhalation Concentration													
NA = not available													
Rf <sub>c</sub> = Reference Concentration													
RfD <sub>d</sub> = Dermal Reference Dose													
RfD <sub>i</sub> = Inhalation Reference Dose													
RfDo = Oral Reference Dose													

**Table D-5.** Evaporation pond operator scenario—potential excess lifetime cancer risk.

Constituent	WOE	$SF_i$	EPC (mg/m <sup>3</sup> )	Inhalation		% Contribution
				CDI (mg/kg-day)	ELCR (mg/kg-day)	
1,1,1-Trichloroethane	D		1.62E-03	1.09E-05		
1,1,2,2-Tetrachloroethane	C	2.03E-01	1.89E-16	1.27E-18	3E-19	0.00
1,1,2-Trichloroethane	C	5.60E-02	3.57E-05	2.39E-07	1E-08	13.03
1,1-Dichloroethane	C		7.11E-10	4.77E-12		
1,1-Dichloroethene	C	1.75E-01	1.15E-09	7.73E-12	1E-12	0.00
1,2,4-Trichlorobenzene	D		1.06E-07	7.10E-10		
1,2-Dichlorobenzene	D		2.16E-115	1.45E-117		
1,2-Dichloroethane	B2	9.10E-02	1.38E-10	9.26E-13	8E-14	0.00
1,2-Dichloroethene (total)	D		3.28E-07	2.20E-09		
1,3-Dichlorobenzene	D		2.47E-07	1.66E-09		
1,4-Dichlorobenzene	C	2.20E-02	1.25E-05	8.39E-08	2E-09	2
2-Butanone	D		6.86E-04	4.60E-06		
2-Chloronaphthalene			7.35E-13	4.93E-15		
2-Chlorophenol			3.23E-181	2.17E-183		
2-Methylnaphthalene			4.07E-03	2.73E-05		
2-Nitroaniline			4.08E-03	2.74E-05		
3-Nitroaniline			4.08E-03	2.74E-05		
4-Methyl-2-Pentanone			1.32E-37	8.84E-40		
4-Nitroaniline			4.08E-03	2.74E-05		
Acenaphthene	D		7.28E-14	4.88E-16		
Acenaphthylene	D		7.74E-11	5.19E-13		
Acetone	D		4.52E-114	3.03E-116		
Acetonitrile	C		4.11E-34	2.76E-36		
Acrolein	B1	2.38E-01	4.72E-38	3.17E-40		
Acrylonitrile	D		7.65E-27	5.13E-29	1E-29	0.00
Anthracene	D		2.66E-11	1.78E-13		
Benzene	A	2.70E-02	8.54E-06	5.73E-08	2E-09	1.50
bis(2-Chloroethyl)ether	B2	1.16E+00	2.35E-09	1.58E-11	2E-11	0.02
bis(2-Chloroisopropyl)ether	C	3.50E-02	3.55E-10	2.38E-12	8E-14	0.00
Carbon Disulfide	D		1.39E-296	9.35E-299		
Chlorobenzene	D		8.63E-09	5.79E-11		
Chloroethane			4.62E-51	3.10E-53	9E-56	0.00
Chloromethane	C	2.90E-03	2.00E-03	1.34E-05	8E-08	82.31
Dibenzofuran	D	6.30E-03	1.66E-36	1.12E-38		

**Table D-5. Evaporation pond operator scenario—potential excess lifetime cancer risk.**

Constituent	WOE	$SF_i$	EPC	Inhalation		% Contribution
				(mg/kg-day) <sup>-1</sup>	(mg/m <sup>3</sup> )	
Ethylbenzene	D		1.0E-09	6.75E-12		
Methyl Acetate			1.1E-05	7.45E-08		
Methylene Chloride	B2	1.65E-03	2.47E-43	1.66E-45	3E-48	0.00
Naphthalene	C		7.50E-17	5.03E-19		
Nitrobenzene	B2		2.32E-09	1.56E-11		
Styrene	C		3.15E-13	2.11E-15		
Tetrachloroethene	C-B2	2.03E-03	9.12E-06	6.12E-08	1E-10	0.12
Toluene	D		1.23E-31	8.23E-34		
Trichloroethene	B2	6.00E-03	3.11E-05	2.09E-07	1E-09	1.22
Xylene (ortho)	D		2.66E-22	1.78E-24		
Xylene (total)	D		2.36E-19	1.59E-21		
<b>Estimated Total Risk =</b>				1E-07	100	

Guide to Appendix D Table Abbreviations:

ABSD = Dermal Absorption Factor	SF = slope factor
ABSGi = Gastrointestinal Absorption Factor	SFd = Dermal Slope Factor
CDI = Chronic Daily Intake	Sfi = Inhalation Slope Factor
ELCR = Excess Lifetime Cancer Risk	SFo = Oral Slope Factor
EPC = Exposure Point Concentration	URF = Inhalation Unit Risk Factor
HI = hazard index	WOE = Weight of Evidence
HQ = hazard quotient	Cancer WOE Classifications:
IC = Inhalation Concentration	Group A: Human carcinogen.
NA = not available	Group B: Probably human carcinogen.
Rf <sub>c</sub> = Reference Concentration	B1 - indicates that limited human data are available.
RtDd = Dermal Reference Dose	B2 - indicates sufficient evidence in animals and inadequate or no evidence in humans.
RtDi = Inhalation Reference Dose	Group C: Possible human carcinogen.
RtDo = Oral Reference Dose	Group D: Not classifiable.

**Table D-6. Evaporation pond operator scenario—potential noncarcinogenic risk.**

Constituent	RID <sub>i</sub> (mg/kg day)	EPC (mg/kg)	Inhalation		Contribution %
			CDI (mg/kg day)	HQ (mg/kg day)	
1,1,1-Trichloroethane	2.86E-01	1.62E-03	3.04E-05	1.07E-04	0.0026
1,1,2,2-Tetrachloroethane	6.00E-02	1.89E-16	3.55E-18	5.92E-17	1.47E-15
1,1,2-Trichloroethane	4.00E-03	3.57E-05	6.70E-07	1.67E-04	0.0042
1,1-Dichloroethane	1.43E-01	7.11E-10	1.34E-11	9.35E-11	2.32E-09
1,1-Dichloroethene	9.00E-03	1.15E-09	2.16E-11	2.40E-09	5.97E-08
1,2,4-Trichlorobenzene	5.70E-02	1.06E-07	1.99E-09	3.49E-08	8.66E-07
1,2-Dichlorobenzene	5.71E-02	2.16E-115	4.06E-117	7.11E-116	1.76E-114
1,2-Dichloroethane	1.40E-03	1.38E-10	2.59E-12	1.85E-09	4.60E-08
1,2-Dichloroethene (total)	1.00E-02	3.28E-07	6.17E-09	6.17E-07	1.53E-05
1,3-Dichlorobenzene	9.00E-04	2.47E-07	4.65E-09	5.16E-06	1.28E-04
1,4-Dichlorobenzene	2.29E-01	1.25E-05	2.35E-07	1.03E-06	2.55E-05
2-Butanone	2.86E-01	6.86E-04	1.29E-05	4.51E-05	0.0011
2-Chloronaphthalene	8.00E-02	7.35E-13	1.38E-14	1.72E-13	4.28E-12
2-Chlorophenol	5.00E-03	3.23E-181	6.07E-183	1.21E-180	3.01E-179
2-Methylnaphthalene	2.00E-02	4.07E-03	7.64E-05	0.0038	0.095
2-Nitroaniline	5.71E-05	4.08E-03	7.66E-05	1.3	33
3-Nitroaniline	5.71E-05	4.08E-03	7.66E-05	1.3	33
4-Methyl-2-Pentanone	2.29E-02	1.32E-37	2.47E-39	1.08E-37	2.69E-36
4-Nitroaniline	5.71E-05	4.08E-03	7.66E-05	1.3	33
Acenaphthene	6.00E-02	7.28E-14	1.37E-15	2.28E-14	5.66E-13
Acenaphthylene	6.00E-02	7.74E-11	1.45E-12	2.42E-11	6.01E-10
Acetone	1.00E-01	4.52E-114	8.49E-116	8.49E-115	2.11E-113
Acetonitrile	1.70E-02	4.11E-34	7.72E-36	4.54E-34	1.13E-32
Acrolein	5.71E-06	4.72E-38	8.86E-40	1.55E-34	3.85E-33
Acrylonitrile	5.71E-04	7.65E-27	1.44E-28	2.52E-25	6.25E-24
Anthracene	3.00E-01	2.66E-11	4.99E-13	1.66E-12	4.13E-11
Benzene	1.71E-03	8.54E-06	1.60E-07	9.39E-05	0.0023
bis(2-Chloroethyl)ether		2.35E-09	4.41E-11		
bis(2-Chloroisopropyl)ether	4.00E-02	3.55E-10	6.67E-12	1.67E-10	4.14E-09
Carbon Disulfide	2.00E-01	1.39E-296	2.62E-298	1.31E-297	3.25E-296
Chlorobenzene	1.70E-02	8.63E-09	1.62E-10	9.53E-09	2.37E-07
Chloroethane	2.86E+00	4.62E-51	8.67E-53	3.03E-53	7.54E-52
Chloromethane	8.66E-02	2.00E-03	3.76E-05	4.38E-04	0.011
Dibenzofuran	4.00E-03	1.66E-36	3.12E-38	7.81E-36	1.94E-34

**Table D-6. Evaporation pond operator scenario—potential noncarcinogenic risk.**

Constituent	RfD <sub>i</sub> (mg/kg-day)	EPC (mg/kg)	Inhalation		Contribution %
			CDI	HQ	
Ethylbenzene	2.90E-01	1.01E-09	1.89E-11	6.52E-11	1.62E-09
Methyl Acetate	1.00E+00	1.11E-05	2.09E-07	2.09E-07	5.18E-06
Methylene Chloride	8.57E-01	2.47E-43	4.64E-45	5.41E-45	1.34E-43
Naphthalene	8.57E-04	7.50E-17	1.41E-18	1.64E-15	4.08E-14
Nitrobenzene	5.71E-04	2.32E-09	4.36E-11	7.63E-08	1.90E-06
Styrene	2.90E-01	3.15E-13	5.91E-15	2.04E-14	5.06E-13
Tetrachloroethene	1.14E-01	9.12E-06	1.71E-07	1.50E-06	3.73E-05
Toluene	1.10E-01	1.23E-31	2.30E-33	2.09E-32	5.20E-31
Trichloroethene	6.00E-03	3.11E-05	5.85E-07	9.74E-05	0.0024
Xylene (ortho)	2.00E-01	2.66E-22	4.99E-24	2.50E-23	6.20E-22
Xylene (total)	2.00E-01	2.36E-19	4.44E-21	2.22E-20	5.51E-19
<b>Total HI =</b>			<b>4.0</b>	<b>100</b>	

Guide to Appendix D Table Abbreviations:

- ABSD = Dermal Absorption Factor
- ABSG = Gastrointestinal Absorption Factor
- CDI = Chronic Daily Intake
- ELCR = Excess Lifetime Cancer Risk
- EPC = Exposure Point Concentration
- HI = hazard index
- HQ = hazard quotient
- IC = Inhalation Concentration
- NA = not available
- Rf<sub>C</sub> = Reference Concentration
- RfD<sub>d</sub> = Dermal Reference Dose
- RfD<sub>i</sub> = Inhalation Reference Dose
- RfD<sub>o</sub> = Oral Reference Dose
- SF = slope factor
- SFD = Dermal Slope Factor
- SFI = Inhalation Slope Factor
- SFO = Oral Slope Factor
- URF = Inhalation Unit Risk Factor
- WOE = Weight of Evidence
- Cancer WOE Classifications:
  - Group A: Human carcinogen.
  - Group B: Probably human carcinogen.
- B1 - indicates that limited human data are available.
- B2 - indicates sufficient evidence in animals and inadequate or no evidence in humans.
- Group C: Possible human carcinogen.
- Group D: Not classifiable.

Table D-7. ICDF visitor scenario (at ICDF landfill)—potential excess lifetime cancer risk.

Constituent	WOE	Sf <sub>d</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>d</sub> (mg/kg-day) <sup>-1</sup>	Sf (mg/kg-day) <sup>-1</sup>	EPC (mg/kg)	ABS <sub>d</sub> (mg/kg)	ABS <sub>s</sub> (mg/kg)	Ingestion		Dermal		Inhalation			
								CDI	CDI (mg/kg-day)	ELCR	CDI	CDI (mg/kg-day)	ELCR		
1,1,1-Trichloroethane	D	2.00E-01	2.00E-01	2.03E-01	1.57E-02	1	1.32E-11	1	1.16E-10	3.66E-13	7E-14	8E-14	0.00		
1,1,2,2-Tetrachloroethane	C	5.70E-02	5.70E-02	5.60E-02	4.93E-05	1	4.15E-14	1	1.79E-12	1E-13	1E-13	1E-13	0.00		
1,1,2-Trichloroethane	C	1.10E-02	1.10E-02	1.10E-02	2.42E-04	1	2.03E-13	1	1.96E-12	1.24E-12	1.73E-11	1.09E-11	0.01		
1,1-Dichloroethane	C	6.00E-01	6.00E-01	1.75E-01	1.48E-03	1	1.14E-12	1	9.54E-12	7E-13	2E-12	3E-12	0.01		
1,2,4-Trichlorobenzene	D														
1,2-Dichlorobenzene	D	9.10E-02	9.10E-02	9.10E-02	1.14E-02	1	9.54E-12	1	8.41E-11	6.74E-11	4.32E-11	8.41E-11	0.00		
1,2-Dichloroethane	B2	9.10E-02	9.10E-02	9.10E-02	5.38E-06	1	4.51E-15	1	5.98E-14	4E-15	4E-15	4E-15	0.00		
1,2-Dichloroethylene (total)															
1,3-Dichlorobenzene	D	2.40E-02	2.40E-02	2.20E-02	4.50E-01	1	1.14E-02	1	9.54E-12	7E-11	3.33E-09	7E-11	0.2		
1,4-Dichlorobenzene	C	1.10E-02	1.10E-02	1.10E-02	1.88E-05	1	0.10	1	3.77E-10	9E-12	3.00E-16	3E-18	0.00		
1,4-Dioxane	B2														
2,4,5-Trichlorophenol	B2	1.10E-02	1.10E-02	1.09E-02	4.46E-02	1	0.10	1	3.74E-11	2E-16	1.04E-14	1E-16			
2,4,6-Trichlorophenol	B2														
2,4-Dichlorophenol	B2	1.10E-02	1.10E-02	1.09E-02	1.83E-02	1	0.10	1	1.53E-11	2E-13	1.01E-11	1E-13	0.00		
2,4-Dimethylphenol															
2,4-Dinitrophenol	B2														
2,4-Dinitrotoluene	B2	2.07E-02	2.07E-02	0.10	1.40E-02	1	0.10	1	1.53E-11	1.20E-11	1.20E-11	1.20E-11	0.00		
2,6-Dinitrotoluene	B2														
2-Butanone	D														
2-Chloronaphthalene															
2-Chlorophenol															
2-Hexanone															
2-Methylnaphthalene															
2-Methylphenol	C														
2-Nitroaniline															
2-Nitropipiline															
3,3'-Dichlorobenzidine	B2	4.50E-01	4.50E-01	4.50E-01	1.14E-02	1	0.10	1	9.54E-12	4E-12	6.30E-12	3E-12			
3-Nitramine															
4,6-Dinitro-2-methylphenol															
4-Chloraniline															
4-Methyl-2-Pentanone															
4-Methylphenol	C														
4-Nitroaniline	D														
4-Nitrophenol	D														
Acenaphthene	D														
Acenaphthylene	D														
Acetone	D														
Acetonitrile	C														
Acrolein	B1	5.40E-01	5.40E-01	2.38E-01	9.06E-06	1	7.60E-15	1	7.60E-15	4E-15	6.70E-14	2E-14	0.00		
Acrylonitrile	D														
Anthracene	B2	2.50E-02	2.50E-02	2.50E-02	7.00E-02	1	9.60E-14	1	6.45E-12	5E-13	1.21E-10	5E-17	0.00		
Aramide	B2	7.00E-02	7.00E-02	7.69E-03	1.15E-04	0.10	1	1.08E-10	2E-11	5.95E-11	2E-10	2.05E-12	9E-13	0.00	
Arclor-1016	B2	2.00E+00	2.00E+00	1.28E-01	0.04E+00	1	0.14	1	6.04E-10	1E-09	5.58E-10	1E-09	1.15E-11	2E-09	5
Arclor-1254	B2	2.00E+00	2.00E+00	7.21E-01	0.00E+00	1	0.14	1	5.21E-11	1E-10	4.62E-11	1E-10	2E-10	2E-10	4
Arclor-1260	B2	2.00E+00	2.00E+00	6.22E-02	0.03E+00	1	0.14	1	5.06E-10	3E-11	4.46E-09	1E-10	1E-10	1E-10	3
Arclor-1268	A	5.50E-02	5.50E-02	2.70E-02	6.03E-01	0.10	1	2.44E-13	6E-11	1.61E-13	4E-11	4.63E-15	1E-12	2	
Benzene	A	2.30E+02	2.30E+02	2.30E+02	2.91E-04	0.10	1	2.30E+02	1	1.16E-10	2E-12	9E-11	9E-11	0.2	
Benzidine															

Table D-7. ICDF visitor scenario (at ICDF landfill)—potential excess lifetime cancer risk.

Constituent	Ingestion			Dermal						Inhalation				
	WOE	Sf <sub>6</sub>	SF <sub>d</sub>	EPC	CDI	CDI	ELCR	(mg/kg-day)	CDI	(mg/kg-day)	ELCR	Total ELCR	% Contribution	
		(mg/kg-day) <sup>-1</sup>	(mg/kg-day) <sup>-1</sup>	(mg/kg-day) <sup>-1</sup>	ABS <sub>d</sub>	ABS <sub>a</sub>	(mg/kg)	(mg/kg-day)	ELCR	(mg/kg-day)	ELCR	(mg/kg-day)		
Benz(a)anthracene	B2	7.30E-01	7.30E-01	3.10E-01	2.53E-01	0.13	1	2.12E-10	1E-10	4.03E-12	1E-12	3E-10	0.6	
Benz(a)pyrene	B2	7.30E+00	7.30E+00	3.10E+00	1.05E-01	0.13	1	8.79E-11	6E-10	1.67E-12	5E-12	1E-09	2.6	
Benz(b)anthracene	B2	7.30E-01	7.30E-01	3.10E-01	1.79E-01	0.13	1	1.51E-10	1E-10	2.86E-12	9E-13	2E-10	0.4	
Benz(g,h,i)perylene	D				1.14E-02		1	9.54E-12		1.81E-13				
Benz(o)fluoranthene	B2	7.30E-02	7.30E-02	3.10E-02	1.86E-02	0.13	1	1.56E-11	1E-12	2.06E-13	9E-15	2E-12	0.00	
Benzoic acid	D				8.56E-03	0.10	1	7.18E-12		1.36E-13				
bis(2-Chloroethyl)ether	B2	1.10E+00	1.10E+00	1.16E+00	1.14E-02		1	9.54E-12	1E-11	3.57E-11	4E-11	5E-11	0.1	
bis(2-Chloroisopropyl)ether	C	7.00E-02	7.00E-02	3.50E-02	1.14E-02		1	9.54E-12	7E-13	8.41E-11	3E-12	4E-12	0.01	
bis(2-Ethylhexyl)phthalate	B2	1.40E-02	1.40E-02	1.40E-02	1.47E-01	0.10	1	1.23E-10	2E-12	8.14E-11	1E-12	3E-12	0.01	
Butylbenzylphthalate	C				6.79E-02	0.10	1	5.70E-11		1.08E-12				
Carbazole	B2	2.00E-02	2.00E-02	2.00E-02	3.23E-02	0.10	1	2.71E-11		5.16E-13	1E-14	9E-13	0.00	
Carbon Disulfide					4.55E-02		1	3.82E-11		3.37E-10				
Chlorobenzene	D				6.57E-03		1	5.51E-12		4.86E-11				
Chloroethane	C	2.90E-03	2.90E-03	2.90E-03	3.02E-06		1	2.53E-15	7E-18	2.23E-14	6E-17	7E-17	0.00	
Chloromethane	B2	1.30E-02	1.30E-02	6.30E-03	3.53E-04		1	2.96E-13	4E-15	2.61E-12	2E-14	2E-14	0.00	
Chrysene	B2	7.30E-03	7.30E-03	3.10E-03	2.65E-01	0.13	1	2.22E-10	2E-12	1.91E-10	1E-12	3E-12	0.01	
Dibenz(a,h)anthracene	B2	7.30E+00	7.30E+00	3.10E+00	1.14E-02	0.13	1	9.54E-12	7E-11	8.19E-12	6E-11	1.81E-13	1E-10	
Dibenzofuran	D				3.24E-01		1	6.72E-10		1.30E-10				
Diethylphthalate	D				1.14E-02	0.10	1	9.55E-12		1.81E-13				
Dimethylphthalate	D				1.14E-02	0.10	1	9.54E-12		6.30E-12				
Di-n-butylphthalate	D				2.39E-02	0.10	1	2.00E-11		1.32E-11				
Di-n-octylphthalate	D				2.62E-02	0.10	1	2.20E-11		1.45E-11				
Ethylbenzene	D				7.81E-02		1	6.55E-11		5.77E-10				
Famphur	D				5.81E-05		1	4.87E-14		9.26E-16				
Fluoranthene	D				7.62E-01	0.13	1	6.39E-10		1.22E-11				
Fluorene	D				1.84E-01		1	1.54E-10		2.93E-12				
Hexachlorobenzene	B2	1.60E+00	1.60E+00	1.61E+00	1.14E-02	0.10	1	9.54E-12	2E-11	6.30E-12	1E-11	3E-13	0.06	
Hexachlorobutadiene	C	7.80E-02	7.80E-02	7.80E-02	1.14E-02	0.10	1	1.73E-11	1E-12	1.14E-11	9E-13	3E-14	0.00	
Hexachlorocyclopentadiene	D				1.40E-02	0.10	1	9.54E-12		1.81E-13				
Hexachloroethane	C	1.40E-02	1.40E-02	1.40E-02	1.14E-02	0.13	1	9.54E-12	1E-13	6.30E-12	9E-14	1.81E-13	1E-11	
Indeno(1,2,3-c)pyrene	B2	7.30E-01	7.30E-01	3.10E-01	1.14E-02	0.10	1	1.58E-14		3.00E-16				
Isobutyl alcohol	C				9.50E-04	0.10	1	9.55E-12	9E-15	6.30E-12	6E-15	1.81E-13	2E-14	
Isophorone	C				1.80E+01	1.80E+01	0.10	1	8.32E-11	1E-09	5.49E-11	1E-09	1.58E-12	3E-11
Kepone	D				4.84E-01		1	4.06E-13		2.53E-12				
Metyl Acetate	B2	7.50E-03	7.50E-03	1.65E-03	8.36E-02		1	7.01E-11		6.18E-10				
Methylene Chloride	C				4.25E-01		1	3.57E-10		2.41E-09				
Naphthalene	B2	7.00E+00	7.00E+00	7.00E+00	1.14E-02	0.10	1	9.54E-12		1.81E-11				
Nitrobenzene	B2	4.90E-03	4.90E-03	1.14E-02	0.10		1	9.54E-12	7E-11	6.30E-12	3E-14	1.81E-13	1E-11	
N-Nitroso-di-n-propylamine	B2	1.20E-01	1.20E-01	1.20E-01	5.59E-02	0.25	1	4.69E-11	6E-12	7.73E-11	9E-12	8.91E-13	2E-11	
Pentachlorophenol	D				1.17E+00		1	9.80E-10		1.86E-11				
Phenanthrene	D				7.98E-02	0.10	1	6.69E-11		4.42E-11				
Pyrene	D				2.53E-01		1	2.12E-10		4.04E-12				
Styrene	C				1.03E-06		1	8.60E-16		7.59E-15				
Tetrachloroethene	C-B2	5.20E-02	5.20E-02	2.03E-03	9.64E-03		1	8.08E-12		4E-13		7.13E-11	1E-13	
Toluene	D				9.82E-01		1	8.24E-10		7.26E-09				
Trichloroethene	B2	1.10E-02	1.10E-02	6.00E-03	7.20E-02		1	6.04E-11		7E-13		5.33E-10	3E-12	
Xylene (ortho)					3.88E-03		1	3.26E-12		2.87E-11				

**Table D-7. ICDF visitor scenario (at ICDF landfill)—potential excess lifetime cancer risk.**

Constituent	WOE D	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>d</sub> (mg/kg-day) <sup>-1</sup>	Sf <sub>i</sub> (mg/kg-day) <sup>-1</sup>	EPC (mg/kg)	ABS <sub>d</sub>	ABS <sub>s</sub>	Ingestion			Derma			Inhalation		
								CDI (mg/kg-day)	ELCR	CDI (mg/kg-day)	CDI (mg/kg-day)	CDI (mg/kg-day)	CDI (mg/kg-day)	% Contribution		
<b>Xylene (total)</b>																
Aluminum	D	1.50E+00	1.50E+00	1.51E+01	3.45E+00	7.08E+03	1	2.90E-09						2.55E-08		
Antimony	A	8.40E+00	8.40E+00	5.63E+00	5.63E+00	5.83E+00	0.03	0.15	4.89E-09	1	5.94E-06			1.13E-07		
Arsenic	D	8.40E+00	8.40E+00	1.79E+02	2.87E+01	1.79E+02		0.07	1.51E-07		9.29E-11			9.01E-11		
Barium	B1	D	D	1.85E+02	1.85E+02			0.007	2.41E-10		2.86E-09			4.58E-12		
Beryllium	B1	D	D	6.30E+00	3.59E+00	3.59E+00	0.001	1	1.53E-07		2.94E-09			4E-11		
Boron	B1	A	A	4.20E+01	4.12E+01	4.12E+01		0.025	3.01E-09	1.98E-11	5.72E-11			4E-11		
Cadmium	D	D	D	6.04E+00	2.99E+01	2.99E+01		1	5.06E-09		6.56E-10			3E-08		
Chromium	Cyanide	D	D	5.93E+01	5.93E+01	5.93E+01		1	2.82E-10		9.62E-11			4.77E-10		
Dysprosium	D	D	D	3.87E+00	1.02E+04	1.02E+04		1	3.24E-09		9.46E-12			5.37E-12		
Fluoride	Iron	D	D	8.46E+01	2.07E+02	2.07E+02		0.06	1.73E-07		6.16E-11			1.63E-07		
Manganese	Mercury	D	D	9.84E+00	9.45E+00	9.45E+00		0.07	7.92E-09		3.30E-09			1.51E-10		
Molybdenum	Nickel	D	D	1.02E+01	1.97E+01	1.97E+01		1	8.54E-09		1.62E-10			1.62E-10		
Nickel	Selenium	D	D	8.46E+01	8.46E+01	8.46E+01		0.04	1.65E-08		3.13E-10			3.13E-10		
Selenium	Silver	D	D	9.84E+00	1.32E+01	9.84E+00		0.04	8.25E-09		1.35E-11			1.57E-10		
Silver	Strontium	D	D	3.70E+01	3.70E+01	3.70E+01		1	1.53E-08		2.90E-10			5.90E-12		
Strontium	Thallium	D	D	2.12E+01	2.12E+01	2.12E+01		0.026	3.11E-10		3.39E-10			3.32E-09		
Thallium	Zinc	D	D	2.08E+02	-	-	1	1.74E-07	1E-08		1E-08			100		
<b>Estimated Subtotals</b>																
										5E-09	3E-08	5E-08	5E-08	100		
													<b>Estimated Total Risk =</b>	<b>5E-08</b>		

Guide to Appendix D Table Abbreviations:

- ABsd = Dermal Absorption Factor
- ABsg = Gastrointestinal Absorption Factor
- CDI = Chronic Daily Intake
- ELCR = Excess Lifetime Cancer Risk
- EPC = Exposure Point Concentration
- HI = hazard index
- HQ = hazard quotient
- IC = Inhalation Concentration
- NA = not available
- Rfc = Reference Concentration
- RDD = Dermal Reference Dose
- RDI = Inhalation Reference Dose
- RDO = Oral Reference Dose

SF = slope factor

SFd = Dermal Slope Factor

Sfi = Inhalation Slope Factor

SFo = Oral Slope Factor

URF = Inhalation Unit Risk Factor

WOE = Weight of Evidence

Cancer WOE Classifications:

Group A: Human carcinogen.

Group B: Probably human carcinogen.

B1 - indicates that limited human data are available.

B2 - indicates sufficient evidence in animals and inadequate or no evidence in humans.

Group C: Possible human carcinogen.

Group D: Not classifiable.



Table D-8. ICDF visitor scenario (at ICDF landfill) — potential noncarcinogenic risk.

Constituent	Inhalation										
	RFD <sub>o</sub> (mg/kg-day)	RFD <sub>d</sub> (mg/kg-day)	RID <sub>i</sub> (mg/kg-day)	EPC (mg/kg)	ABS <sub>a</sub>	ABS <sub>b</sub>	CDI		Dermal	Total HI	
				(mg/kg/day)	HQ	(mg/kg-day)	CDD	(mg/kg-day)	HQ	(mg/kg-day)	Contribution
Aroclor-1016	7.00E-05	7.00E-05	7.00E-05	7.69E-03	0.14	1	3.01E-11	4.30E-07	2.78E-13	8.17E-09	8.35E-07
Aroclor-1254	2.00E-05	2.00E-05	2.00E-05	1.28E-01	0.14	1	5.02E-10	2.51E-05	4.64E-10	2.32E-05	4.88E-05
Aroclor-1260				7.21E-01	0.14	1	2.82E-09	2.61E-09	5.36E-11		
Aroclor-1268	3.00E-03	3.00E-03	1.71E-03	6.03E-01	1	2.43E-10	2.25E-10			4.62E-12	
Benzene				6.22E-02	0.14	1	2.36E-09	7.87E-07			2.08E-08
Benzidine	3.00E-03	3.00E-03	3.00E-03	2.91E-04	0.10	1	1.14E-12	3.79E-10	7.51E-13	2.50E-10	2.16E-14
Benzo(a)anthracene				2.53E-01	0.13	1	9.90E-10		8.50E-10		1.88E-11
Benzo(a)pyrene				1.03E-01	0.13	1	4.10E-10		3.52E-10		7.80E-12
Benzo(b)fluoranthene				1.79E-01	0.13	1	7.02E-10		6.03E-10		1.34E-11
Benzo(g,h,i)perylene				1.14E-02	0.14	1	4.45E-11	1.48E-09			8.46E-13
Benzo(k)fluoranthene	3.00E-02	3.00E-02	3.00E-02	1.80E-02	0.13	1	7.23E-11	6.22E-11	2.82E-11	1.51E-09	6.60E-05
Benzoic acid	4.00E+00	4.00E+00	4.00E+00	8.56E-03	0.10	1	3.35E-11	8.37E-12	2.21E-11	5.53E-12	1.38E-12
bis(2-Chloroethyl)ether	4.00E-02	4.00E-02	4.00E-02	1.14E-02	0.10	1	4.45E-11	1.11E-09			6.37E-13
bis(2-Chloroisopropyl)ether	2.00E-02	2.00E-02	2.20E-02	1.14E-02	0.10	1	4.45E-11	2.88E-08			1.67E-10
bis(2-Ethylhexyl)phthalate				1.47E-01	0.10	1	5.76E-10	1.33E-09	1.75E-10	8.77E-10	3.93E-10
Butylbenzylphthalate	2.00E-01	2.00E-01	2.00E-01	6.79E-02	0.10	1	1.27E-10		8.36E-11		1.09E-11
Carbazole				3.23E-02	0.10	1	1.26E-10	1.33E-09	1.75E-10	8.77E-10	5.06E-12
Carbon Disulfide	1.00E-01	1.00E-01	2.00E-01	2.00E-01	0.10	1	1.78E-10	1.78E-09			2.41E-12
Chlorobenzene	2.00E-02	2.00E-02	1.70E-02	6.57E-03	0.10	1	2.57E-11	1.29E-09			1.57E-09
Chloroethane	4.00E-01	4.00E-01	2.86E+00	3.02E-06	0.10	1	1.18E-14	2.95E-14			1.04E-13
Chloromethane				8.60E-02	3.53E-04	1	1.38E-12				3.64E-14
Chrysene				2.65E-01	0.13	1	1.04E-09		8.91E-10		1.22E-11
Dibenz(a,h)anthracene	4.00E-03	4.00E-03	4.00E-03	1.14E-02	0.13	1	4.45E-11		3.82E-11		1.97E-11
Dibenzofuran	8.00E-01	8.00E-01	8.00E-01	3.24E-01	0.13	1	1.27E-09	3.17E-07			8.46E-13
Diethylphthalate				1.14E-02	0.10	1	4.45E-11	5.57E-11	2.94E-11	3.68E-11	6.07E-10
Dimethylphthalate	1.00E+01	1.00E+01	1.00E+01	1.14E-02	0.10	1	4.45E-11	4.45E-12	2.94E-11	2.94E-12	8.46E-13
Di-n-butylphthalate	1.00E-01	1.00E-01	1.00E-01	2.39E-02	0.10	1	9.33E-11	9.33E-10	6.16E-11	6.16E-10	1.77E-12
Di-n-octylphthalate	2.00E-02	2.00E-02	2.00E-02	2.62E-02	0.10	1	1.03E-10	5.13E-09	6.77E-11	3.39E-09	1.95E-12
Ethylbenzene	1.00E-01	1.00E-01	2.90E-01	7.81E-02	0.10	1	3.06E-10	3.06E-09			2.69E-09
Famphur				5.81E-05	1	2.27E-13					4.32E-15
Fluoranthene	4.00E-02	4.00E-02	4.00E-02	7.62E-01	0.13	1	2.98E-09	7.46E-08			5.67E-11
Fuorene	4.00E-02	4.00E-02	4.00E-02	1.84E-01	0.10	1	7.18E-10	1.80E-08			1.37E-11
Hexachlorobenzene	8.00E-04	8.00E-04	8.00E-04	1.44E-02	0.10	1	4.45E-11	5.57E-08	2.94E-11	3.67E-08	8.46E-13
Hexachlorobutadiene	3.00E-04	3.00E-04	3.00E-04	2.07E-02	0.10	1	8.08E-11	2.70E-07	5.34E-11	1.78E-07	1.06E-09
Hexachlorocyclopentadiene	7.00E-03	7.00E-03	7.00E-03	1.14E-02	0.10	1	4.45E-11	6.36E-09	2.94E-11	4.23E-08	5.29E-08
Hexachloroethane	1.00E-03	1.00E-03	1.00E-03	4.45E-02	0.10	1	4.45E-11	4.45E-08	2.94E-11	4.23E-08	5.13E-09
Indeno(1,2,3-cd)pyrene				1.14E-02	0.13	1	4.45E-11	3.82E-11			8.46E-13
Isobutyl alcohol	3.00E-01	3.00E-01	3.00E-01	1.88E-05	0.10	1	7.36E-14	2.45E-13			1.40E-15
Isophorone	2.00E-01	2.00E-01	2.00E-01	1.14E-02	0.10	1	4.45E-11	2.23E-10	2.94E-11	1.47E-10	8.47E-13
Kepone				9.92E-02	0.10	1	3.88E-10		2.56E-10		7.38E-12
Methyl Acetate	1.00E+00	1.00E+00	1.00E+00	4.84E-04	0.10	1	1.89E-12	1.89E-12			1.18E-11
Methylene Chloride	6.00E-02	6.00E-02	8.57E-01	8.36E-02	0.10	1	3.27E-10	5.45E-09			2.89E-09
Naphthalene	2.00E-02	2.00E-02	8.57E-04	4.25E-01	0.10	1	1.66E-09	8.32E-08			1.31E-05

**Table D-8. ICDF visitor scenario (at ICDF landfill)—potential noncarcinogenic risk.**

Constituent	RfD <sub>a</sub> (mg/kg-day)	RfD <sub>d</sub> (mg/kg-day)	RfD <sub>i</sub> (mg/kg-day)	EPC (mg/kg)	ABS <sub>d</sub>	ABS <sub>i</sub> (mg/kg/day)	Ingestion		Dermal		Inhalation	
							CDI	HQ	CDI	HQ	(mg/kg-day)	CDDI
Nitrobenzene	5.00E-04	5.00E-04	5.71E-04	1.14E-02	0.10	1	4.45E-11	8.91E-08	2.07E-10	3.63E-07	4.52E-07	0.020
N-Nitroso-di-n-propylamine				1.14E-02	0.10	1	4.45E-11	2.94E-11	8.46E-13	8.46E-13	8.46E-13	8.46E-04
N-Nitrosodiphenylamine				1.14E-02	0.10	1	4.45E-11	2.94E-11	1.20E-08	4.16E-12	1.39E-10	1.95E-08
Pentachlorophenol	3.00E-02	3.00E-02	3.00E-02	5.59E-02	0.25	1	2.19E-10	7.29E-09	3.61E-10	2.90E-10	1.55E-08	6.77E-04
Phenanthrene	3.00E-01	3.00E-01	3.00E-01	1.17E+00		1	4.57E-09	1.52E-08			5.94E-12	8.74E-10
Phenol	6.00E-01	6.00E-01	6.00E-01	7.98E-02	0.10	1	3.12E-10	5.20E-10	2.06E-10	3.43E-10	1.88E-11	6.29E-10
Pyrene	3.00E-02	3.00E-02	3.00E-02	2.53E-01		1	9.91E-10	3.30E-08			3.54E-14	1.22E-13
Styrene	2.00E-01	2.00E-01	2.00E-01	1.03E-06		1	4.01E-15	2.01E-14			3.33E-10	6.68E-09
Tetrachloroethene	1.00E-02	1.00E-02	1.14E-01	9.64E-03		1	3.77E-11	3.77E-09			3.39E-08	3.08E-07
Toluene	2.00E-01	2.00E-01	1.10E-01	9.82E-01		1	3.84E-09	1.92E-08			3.27E-07	3.27E-07
Trichloroethene	6.00E-03	6.00E-03	6.00E-03	7.20E-02		1	2.83E-10	4.70E-08			4.14E-07	4.61E-07
Xylene (ortho)	2.00E+00	2.00E+00	2.00E+00	3.88E-03		1	1.52E-11	7.60E-12			1.34E-10	6.78E-10
Xylene (total)	2.00E+00	2.00E+00	2.00E+00	3.45E-03		1	1.35E-08	6.76E-09			1.19E-07	5.96E-07
Aluminum	1.00E+00	1.00E+00	1.40E-03	7.08E+03		1	2.77E-05	2.77E-05			5.27E-07	5.08E-04
Antimony	4.00E-04	6.00E-05	5.83E+00	0.15		1	2.28E-08	5.70E-05			4.34E-10	5.70E-05
Arsenic	3.00E-04	3.00E-04	5.63E+00	0.03		1	2.21E-08	7.37E-05			4.20E-10	8.82E-05
Barium	7.00E-02	4.90E-03	1.43E-04	1.79E+02		0.07	7.02E-07	1.00E-05			1.34E-08	9.35E-05
Beryllium	2.00E-03	1.40E-05	5.71E-06	2.87E-01		0.007	1.12E-09	5.62E-07			2.14E-11	3.74E-06
Boron	9.00E-02	9.00E-02	5.71E-03	1.85E+02		1	7.22E-07	8.03E-06			1.37E-08	2.40E-06
Cadmium	5.00E-04	2.50E-05	3.59E+00	0.001		0.03	1.40E-08	2.81E-05			2.67E-10	3.55E-05
Chromium			4.12E+01	0.025		1.61E-07	4.38E-09	1.46E-05			4.20E-10	3.85
Cobalt	6.00E-02	6.00E-02	3.71E-02	8.57E-04		1	2.30E-08	3.94E-07			4.49E-10	9.35E-04
Copper	3.71E-02	2.00E-02	2.00E-02	5.99E+01		1	1.17E-07	3.15E-06			2.22E-09	4.5
Cyanide	2.00E-02	2.00E-01	5.93E+01			1	1.32E-09	6.59E-08			2.50E-11	9.51E-08
Dysprosium		2.00E-01	6.00E-02	3.87E+00		1	2.32E-07	1.16E-06			4.41E-09	1.16E-06
Fluoride			3.00E-01	1.02E+04		1	1.51E-08	2.52E-07			2.88E-10	2.52E-07
Iron			2.40E-02	1.44E-03	1.40E-05	0.004	4.01E-05	1.34E-04			7.62E-07	1.34E-04
Manganese	3.00E-04	2.10E-05	9.45E+00	0.07		0.025	1.61E-07	3.37E-05			1.54E-08	0.0011
Mercury		5.00E-03	5.00E-03	1.82E+01		1	3.98E-08	1.23E-04			7.03E-10	5.4
Molybdenum	2.00E-02	8.00E-04	1.97E+01	0.04		0.026	7.68E-08	3.85E-06			7.57E-10	7.97E-06
Nickel		5.00E-03	5.00E-03	8.46E-01		1	3.31E-09	6.62E-07			1.46E-09	3.85E-06
Selenium		5.00E-03	2.00E-04	9.84E+00		0.04	3.83E-08	7.70E-06			6.29E-11	6.62E-07
Silver	5.00E-03	6.00E-01	6.00E-05	1.32E-01		1	7.12E-08	1.19E-07			1.35E-09	1.19E-07
Strontium		6.60E-05	7.70E-01	1		0.026	1.43E-09	2.20E-05			2.75E-11	2.20E-05
Thallium		1.82E-04	2.12E+01	0.026		1	8.32E-08	1.19E-05			1.58E-09	1.19E-05
Vanadium	7.00E-03	3.00E-01	3.00E-01	2.08E+02		1	8.14E-07	2.71E-06			1.55E-08	2.71E-06
Zinc							5.91E-04	4.50E-05			0.0017	0.0023

Subtotal Hazard Indices

Guide to Appendix D Table Abbreviations:

**Table D-8. ICDF visitor scenario (at ICDF landfill)—potential noncarcinogenic risk.**

Constituent	RfD <sub>o</sub> (mg/kg-day)	RfD <sub>d</sub> (mg/kg-day)	RfD <sub>i</sub> (mg/kg-day)	EPC (mg/kg)	Ingestion		Dermal		Inhalation			
					CDI	ABS <sub>gi</sub> (mg/kg-day)	CDI	ABS <sub>d</sub> (mg/kg-day)	HQ	CDI	ABS <sub>i</sub> (mg/kg-day)	HQ
<b>ABS<sub>d</sub> = Dermal Absorption Factor</b>												
ABS <sub>gi</sub> = Gastrointestinal Absorption Factor				SF = slope factor	SFD = Dermal Slope Factor							
CDI = Chronic Daily Intake					SFI = Inhalation Slope Factor							
ELCR = Excess Lifetime Cancer Risk					SFO = Oral Slope Factor							
EPC = Exposure Point Concentration					URF = Inhalation Unit Risk Factor							
HI = hazard index					WOE = Weight of Evidence							
HQ = hazard quotient					Cancer WOE Classifications:							
IC = Inhalation Concentration					Group A: Human carcinogen.							
NA = not available					Group B: Probably human carcinogen.							
Rf <sub>C</sub> = Reference Concentration					B1 - indicates that limited human data are available.							
RfD <sub>d</sub> = Dermal Reference Dose					B2 - indicates sufficient evidence in animals and inadequate or no evidence in humans.							
RfD <sub>i</sub> = Inhalation Reference Dose					Group C: Possible human carcinogen.							
RfD <sub>o</sub> = Oral Reference Dose					Group D: Not classifiable.							

Table D-9. ICDF visitor scenario (treatment area)—potential excess lifetime cancer risk.

Constituent	WOE (mg/kg-day) <sup>1</sup>	Sf <sub>d</sub> (mg/kg-day) <sup>1</sup>	Sf <sub>i</sub> (mg/kg-day) <sup>1</sup>	EPC (mg/kg)	ABS <sub>d</sub>	ABS <sub>i</sub>	Ingestion			Dermal			Inhalation		
							CDI (mg/kg-day)	ELCR (mg/kg-day)	CDI (mg/kg-day)	ELCR (mg/kg-day)	CDI (mg/kg-day)	ELCR (mg/kg-day)	Total ELCR	Contribution %	
1,1,1-Trichloroethane	D	2.00E-01	2.00E-01	2.03E-01	6.35E-02	1	5.33E-11						4.70E-10		
1,1,2,2-Tetrachloroethane	C	5.70E-02	5.70E-02	5.60E-02		1									
1,1,2-Trichloroethane	C					1									
1,1-Dichloroethane	C	6.00E-01	6.00E-01	1.75E-01		1									
1,1-Dichloroethene	D					1									
1,2,4-Trichlorobenzene	D					1									
1,2-Dichlorobenzene	B2	9.10E-02	9.10E-02	9.10E-02		1									
1,2-Dichloroethane	B2					1									
1,2-Dichloroethene (total)	D					1									
1,3-Dichlorobenzene	C	2.40E-02	2.40E-02	2.20E-02		1									
1,4-Dichlorobenzene	B2	1.10E-02	1.10E-02	1.10E-02		1									
1,4-Dioxane						1									
2,4,5-Trichlorophenol	B2	1.10E-02	1.10E-02	1.09E-02		1									
2,4-Dichlorophenol						1									
2,4-Dimethylphenol						1									
2,4-Dinitrophenol						1									
2,4-Dinitrotoluene	B2					1									
2,6-Dinitrobenzene	B2					1									
2-Butanone	D					1									
2-Chlorophthalene						1									
2-Chlorophenol						1									
2-Hexanone						1									
2-Methylaphthalene	C					1									
2-Methylphenol						1									
2-Nitroaniline						1									
2-Nitrophenol						1									
3,3-Dichlorobenzidine	B2	4.50E-01	4.50E-01	4.50E-01		1									
3-Nitroaniline						1									
4,6-Dinitro-2-methylphenol						1									
4-Chloraniline						1									
4-Methyl-2-Pentanone						1									
4-Methylphenol	C					1									
4-Nitroaniline	D					1									
4-Nitrophenol						1									
Acenaphthene	D					1									
Acenaphthylene	D					1									
Acetone	D					1									
Acetonitrile						1									
Acrolein	C					1									
Acrylonitrile	B1	5.40E-01	5.40E-01	2.38E-01		1									
Anthracene	D					1									
Aramite	B2	2.50E-02	2.50E-02	2.49E-02		1									
Arcofor-1016	B2	7.00E-02	7.00E-02	9.91E-03		1									
Arcofor-1254	B2	2.00E+00	2.00E+00	7.31E-02		1									
Arcofor-1260	B2	2.00E+00	2.00E+00	2.00E+00		1									
Arcofor-1268	B2	2.00E+00	2.00E+00	3.01E+00		1									
Benzene	A	5.50E-02	5.50E-02	2.70E-02		1									

Table D-9. ICDF visitor scenario (treatment area)—potential excess lifetime cancer risk.

Constituent	WOE	Sf <sub>d</sub> (mg/kg-day) <sup>1</sup>	SF <sub>d</sub> (mg/kg-day) <sup>1</sup>	Sf (mg/kg-day) <sup>1</sup>	EPC (mg/kg)	ABS <sub>d</sub> (mg/kg-day)	ABS <sub>d</sub> (mg/kg-day)	Ingestion		Dermal		Inhalation	
								CDI	ELCR	CDI	ELCR	CDI	ELCR
Benzidine	A	2.30E+02	2.30E+02	2.30E+02	0.10	1	1						% Contribution
Benz(a)anthracene	B2	7.30E-01	7.30E-01	3.10E-01	0.13	1	1						
Benz(a)pyrene	B2	7.30E+00	7.30E+00	3.10E+00	0.13	1	1						
Benzofluoranthene	B2	7.30E-01	7.30E-01	3.10E-01	0.13	1	1						
Benz(g,h,i)perylene	D												
Benz(k)fluoranthene	B2	7.30E-02	7.30E-02	3.10E-02	0.13	1	1						
Benzoic acid	D												
bis(2-Chloroethyl)ether	B2	1.10E+00	1.10E+00	1.16E+00	0.10	1	1						
bis(2-Chloroisopropyl)ether	C	7.90E-02	7.00E-02	3.50E-02	0.10	1	1						
bis(2-Ethylhexyl)phthalate	B2	1.40E-02	1.40E-02	1.40E-02	0.39E-05	1	1	7.88E-14	1E-15	5.20E-14	7E-16	1.50E-15	2E-15
Butylbenzylphthalate	C												0.00
Carbazole	B2	2.00E-02	2.00E-02	2.00E-02	9.39E-05	1	1	7.88E-14	2E-15	5.20E-14	1E-15	1.50E-15	3E-15
Carbon Disulfide													0.00
Chlorobenzene	D												
Chloroethane	D	2.90E-03	2.90E-03	2.90E-03	0.10	1	1						
Chloromethane	C	1.30E-02	1.30E-02	6.30E-03	0.10	1	1						
Chrysene	B2	7.30E-03	7.30E-03	3.10E-03	0.13	1	1						
Dibenz(a,h)anthracene	B2	7.30E+00	7.30E+00	3.10E+00	0.13	1	1						
Dibenzofuran	D												
Diethylphthalate	D												
Dimethylphthalate	D												
Di-n-butylphthalate	D												
Di-n-octylphthalate	D												
Ethylbenzene	D												
Famphur	D												
Fluoranthene	D												
Fluorene	D												
Hexachlorobenzene	B2	1.60E+00	1.60E+00	1.61E+00	0.10	1	1						
Hexachlorobutadiene	C	7.80E-02	7.80E-02	7.80E-02	1.20E-03	1	1	1.01E-12	8E-14	6.64E-13	5E-14	1.91E-14	1E-13
Hexachlorocyclopentadiene	D												
Hexachloroethane	C	1.40E-02	1.40E-02	1.40E-02	0.10	1	1						
Indeno[1,2,3-cd]pyrene	B2	7.30E-01	7.30E-01	3.10E-01	0.13	1	1						
Isobutyl alcohol													
Iosphorone	C	9.50E-04	9.50E-04	9.50E-04	0.10	1	1						
Kepone	C	1.80E+01	1.80E+01	1.80E+01	0.10	1	1						
Methyl Acetate													
Methylene Chloride	B2	7.50E-03	7.50E-03	1.65E-03	0.10	1	1						
Naphthalene	C												
Nitrobenzene	B2	7.00E+00	7.00E+00	7.00E+00	0.10	1	1						
N,N-Nitroso-di-t-butylamine	B2	4.90E-03	4.90E-03	4.90E-03	0.10	1	1						
N,N-Nitrosodiphenylamine	B2	1.20E-01	1.20E-01	1.20E-01	0.24E-03	0.25	1	1.88E-12	2E-13	3.11E-12	4E-13	3.58E-14	4E-15
Pentachlorophenol	D												
Phenanthrene	D												
Phenol	D												
Pyrene													
Styrene	C												
Tetrachloroethene	C-B2	5.20E-02	5.20E-02	2.03E-03	2.49E-03	0.39E-01	1	2.08E-12	1E-13	1.84E-11	4E-14	1E-13	0.00
Toluene	D												

**Table D-9. ICDF visitor scenario (treatment area)—potential excess lifetime cancer risk.**

Constituent	WOE	SF <sub>d</sub>	SF <sub>i</sub>	EPC	Ingestion			Dermal			Inhalation			
					ABS <sub>g</sub>	ABS <sub>d</sub>	CDI	(mg/kg-day)	ELCR	(mg/kg-day)	CDI	(mg/kg-day)	ELCR	
Trichloroethene	B2	1.10E-02	1.10E-02	6.00E-03	2.65E-02	1.39E-03	1	2.22E-11	2E-13	1.96E-10	1E-12	1.96E-10	1E-12	
Xylene (ortho)	D				1.01E+00	1.17E-12	1	1.17E-12		1.03E-11		1.03E-11		
Xylene (total)					1.15E+04	1	9.67E-06			7.47E-09				
Aluminum	D				5.74E-02	0.03	0.15	4.82E-11		9.16E-13				
Antimony	A	1.50E+00	1.50E+00	1.51E-01	1.33E+01	1.92E+02	0.07	1.11E-08	2E-08	2.11E-10	3E-09	2E-08	48	
Barium	D				8.40E+00	1.06E+00	0.097	8.69E-10		1.61E-07		3.05E-09		
Beryllium	B1				6.10E+02	0.001	0.05	5.12E-07		1.69E-11		1E-10	0	
Boron	D				6.30E+00	1.32E+00	0.025	1.11E-09	7.33E-12	9.73E-09		2.11E-11	1E-10	
Cadmium	B1				4.20E+01	3.64E+01	0.025	3.05E-08		5.80E-10		5.80E-10	50	
Chromium	A				1.11E+01	1	9.31E-09			1.77E-10				
Cobalt	D				3.41E+01	1	2.86E-08			5.44E-10				
Cyanide						1	1							
Dysprosium							1.24E+01	1	1.04E-08					
Fluoride							2.28E+04	1	1.91E-05					
Iron	D						4.14E+02	0.06	3.47E-07					
Manganese	D						2.50E+02	0.07	2.10E-09					
Mercury	D						3.37E+01	1	2.83E-08					
Molybdenum	D						4.21E+01	0.04	3.53E-08					
Nickel	D						2.17E+00	1	1.82E-09					
Selenium	D						9.86E-01	0.04	8.27E-10					
Silver	D							1						
Srontium	D						8.09E-03	1	6.78E-12					
Thallium	D						4.59E+01	0.026	3.85E-08					
Vanadium	D						1.19E+02	1	9.97E-08					
<b>Estimated Subtotals</b>								2E-08		3E-09		3E-08		100
										<b>Estimated Total Risk =</b>		<b>5E-08</b>		

Guide to Appendix D Table Abbreviations:

- ABSD** = Dermal Absorption Factor  
**ABSG** = Gastrointestinal Absorption Factor  
**CDI** = Chronic Daily Intake  
**ELCR** = Excess Lifetime Cancer Risk  
**EPC** = Exposure Point Concentration  
**HI** = hazard index  
**HQ** = hazard quotient  
**IC** = Inhalation Concentration  
**NA** = not available  
**RfC** = Reference Concentration  
**RfDd** = Dermal Reference Dose  
**RfDi** = Inhalation Reference Dose  
**RfDo** = Oral Reference Dose

**SF** = slope factor

**SFd** = Dermal Slope Factor

**Sfi** = Inhalation Slope Factor

**SFo** = Oral Slope Factor

**URF** = Inhalation Unit Risk Factor

**WOE** = Weight of Evidence

Cancer WOE Classifications:

Group A: Human carcinogen.

Group B: Probably human carcinogen.

Group C: Possible human carcinogen.

Group D: Not classifiable.

- B1 - indicates that limited human data are available.  
 B2 - indicates sufficient evidence in animals and inadequate or no evidence in humans.

Group C: Possible human carcinogen.

Group D: Not classifiable.

Table D-10. ICDF visitor scenario (treatment area)—potential noncarcinogenic risk.

Constituent	RfD <sub>a</sub> (mg/kg-day)	RfD <sub>d</sub> (mg/kg-day)	RfD <sub>i</sub> (mg/kg-day)	EPC (mg/kg)	Ingestion		Derma		Inhalation		% Contribution
					ABS <sub>d</sub>	ABS <sub>i</sub>	CdI (mg/kg-day)	HQ (mg/kg-day)	CDI (mg/kg-day)	HQ (mg/kg-day)	
1,1,1-Trichloroethane	2.00E-02	2.00E-02	2.86E-01	6.35E-02	1	1	2.49E-10	0.000	2.19E-09	0.000	0.00
1,1,2,2-Tetrachloroethane	6.00E-02	6.00E-02	6.00E-02	6.00E-02	1	1					
1,1,2-Trichloroethane	4.00E-03	4.00E-03	4.00E-03	4.00E-03	1	1					
1,1-Dichloroethane	1.00E-01	1.00E-01	1.43E-01	1.43E-01	1	1					
1,1-Dichloroethene	9.00E-03	9.00E-03	9.00E-03	9.00E-03	1	1					
1,2,4-Trichlorobenzene	1.00E-02	1.00E-02	5.70E-02	5.70E-02	1	1					
1,2-Dichlorobenzene	9.00E-02	9.00E-02	5.71E-02	5.71E-02	1	1					
1,2-Dichloroethane	3.00E-02	3.00E-02	1.40E-03	1.40E-03	1	1					
1,2-Dichloroethylene (total)	1.00E-02	1.00E-02	3.13E-04	3.13E-04	1	1	1.23E-12	0.000	1.08E-11	0.000	0.00
1,3-Dichlorobenzene	9.00E-04	9.00E-04	9.00E-04	9.00E-04	1	1					
1,4-Dichlorobenzene	3.00E-02	3.00E-02	2.29E-01	2.29E-01	1	1					
1,4-Dioxane	1.00E-01	1.00E-01	1.00E-01	2.24E-02	0.10	1	8.78E-11	0.000	5.80E-11	0.000	1.67E-12
2,4,5-Trichlorophenol				8.87E-03	0.10	1	3.47E-11	2.29E-11	6.60E-13	6.60E-13	
2,4,6-Trichlorophenol				3.00E-03	0.10	1					
2,4-Dichlorophenol	3.00E-03	3.00E-03	3.00E-03	2.00E-02	0.10	1	3.47E-11	0.000	2.29E-11	0.000	6.60E-13
2,4-Dimethylphenol	2.00E-02	2.00E-02	2.00E-02	2.00E-02	0.10	1	8.78E-11	0.000	5.80E-11	0.000	1.67E-12
2,4-Dinitrophenol	2.00E-03	2.00E-03	2.00E-03	2.00E-03	0.10	1					
2,4-Dinitrotoluene	2.00E-03	2.00E-03	2.00E-03	2.00E-03	0.10	1	4.70E-11	0.000	3.10E-11	0.000	8.93E-13
2,6-Dinitrodiolene	1.00E-03	1.00E-03	1.00E-03	1.20E-02	0.10	1	2.04E-13	0.000	1.35E-12	0.000	0.00
2-Butanone	6.00E-01	6.00E-01	2.86E-01	5.22E-05	1	1					
2-Chloromaphthalene	8.00E-02	8.00E-02	8.00E-02	8.87E-03	1	1	3.47E-11	0.000	3.47E-11	0.000	3.06E-10
2-Chlorophenol	5.00E-03	5.00E-03	5.00E-03	5.00E-03	1	1					
2-Hexanone	4.00E-02	4.00E-02	1.40E-03	8.87E-03	1	1					
2-Methylnaphthalene	2.00E-02	2.00E-02	5.00E-02	8.87E-03	0.10	1	3.47E-11	0.000	2.29E-11	0.000	6.60E-13
2-Methylphenol	5.00E-02	5.00E-02	5.71E-05	5.71E-05	0.10	1	3.47E-11	0.000	2.29E-11	0.000	6.60E-13
2-Nitroaniline	8.00E-03	8.00E-03	8.00E-03	8.87E-03	0.10	1	3.47E-11	0.000	2.29E-11	0.000	6.60E-13
2-Nitrophenol	5.00E-03	5.00E-03	5.00E-03	8.87E-03	0.10	1					
3,3'-Dichlorobenzidine											
3-Nitroaniline	5.71E-05	5.71E-05	5.71E-05	2.00E-03	0.10	1	8.78E-11	0.000	5.80E-11	0.000	1.67E-12
4,6-Dinitro-2-methylphenol	2.00E-03	2.00E-03	2.24E-02	4.00E-03	0.10	1					
4-Chloraniline	4.00E-03	4.00E-03	4.00E-03	8.00E-02	0.10	1	4.21E-10	0.000	4.21E-10	0.000	3.72E-09
4-Methyl-2-Pentanone	8.00E-02	8.00E-02	1.08E-01	2.29E-02	0.10	1	3.47E-11	0.000	2.29E-11	0.000	6.60E-13
4-Methylphenol	5.00E-03	5.00E-03	5.00E-03	8.87E-03	0.10	1					
4-Nitroaniline	5.71E-05	5.71E-05	5.71E-05	8.00E-03	0.10	1	8.78E-11	0.000	5.80E-11	0.000	1.67E-12
4-Nitrophenol	8.00E-03	8.00E-03	8.00E-03	2.24E-02	0.10	1					
Acenaphthene	6.00E-02	6.00E-02	6.00E-02	1.20E-02	0.10	1	4.70E-11	0.000	1.05E-10	0.000	0.00
Acenaphthylene	6.00E-02	6.00E-02	6.00E-02	1.80E+00	0.000	1	7.27E-09	0.000	6.42E-08	0.000	0.02
Acetone	1.00E-01	1.00E-01	1.00E-01	1.70E-02	0.000	1					
Acetonitrile	6.00E-03	6.00E-03	6.00E-03	2.00E-02	0.000	1	5.71E-06	0.000	0.000	0.000	0.00
Acrolein											
Acrylonitrile	1.00E-03	1.00E-03	5.71E-04								
Anthracene	3.00E-01	3.00E-01	3.00E-01								
Aranilic	5.00E-02	5.00E-02	5.00E-02								

**Table D-10. ICDF visitor scenario (treatment area)—potential noncarcinogenic risk.**

Constituent	RfD <sub>o</sub> (mg/kg-day)	RfD <sub>d</sub> (mg/kg-day)	RfD <sub>i</sub> (mg/kg-day)	EPC (mg/kg)	ABS <sub>d</sub>	ABS <sub>i</sub> (mg/kg-day)	Ingestion		Dermal		Inhalation	
							CDI	HQ	CDI	HQ	CDI	HQ
Aroclor-1016	7.00E-05	7.00E-05	7.00E-05	9.91E-03	0.14	1	3.88E-11	0.000	3.59E-11	0.000	7.38E-13	0.000
Aroclor-1254	2.00E-05	2.00E-05	2.00E-05	7.31E-02	0.14	1	2.86E-10	0.000	2.64E-10	0.000	5.43E-12	0.000
Aroclor-1260												
Aroclor-1268												
Benzene	3.00E-03	3.00E-03	1.71E-03	3.01E-02	0.14	1	1.18E-10	0.000	1.09E-10	0.000	2.24E-12	0.000
Benzidine	3.00E-03	3.00E-03	3.00E-03	2.58E+00	0.10	1	1.01E-08	0.000			8.90E-08	0.000
Benz(a)anthracene												
Benz(a)pyrene												
Benz(b)fluoranthene												
Benz(g,h,i)perylene	3.00E-02	3.00E-02	3.00E-02	3.00E-02	0.13	1						
Benz(k)fluoranthene												
Benzoic acid	4.00E+00	4.00E+00	4.00E+00	4.00E+00	0.10	1						
bis(2-Chloroethyl)ether												
bis(2-Chloroisopropyl)ether	4.00E-02	4.00E-02	4.00E-02	2.20E-02	0.10	1	3.68E-13	0.000	2.43E-13	0.000	6.99E-15	0.000
bis(2-Ethylhexyl)phthalate	2.00E-02	2.00E-02	2.00E-01	2.00E-01	0.10	1	3.68E-13	0.000	2.43E-13	0.000	6.99E-15	0.000
Butylbenzylphthalate	2.00E-01	2.00E-01					7.13E-11	0.000			6.29E-10	0.000
Carbazole												
Carbon Disulfide	1.00E-01	1.00E-01	2.00E-01	2.00E-01	0.10	1						
Chlorobenzene	2.00E-02	2.00E-02	1.70E-02	1.70E-02	0.10	1						
Chloroethane	4.00E-01	4.00E-01	2.80E+00	2.80E+00	0.10	1						
Chloromethane												
Chrysene												
Dibenz(a,h)anthracene												
Dibenzofuran												
Diethylphthalate	4.00E-03	4.00E-03	4.00E-03	8.00E-01	0.10	1						
Dimethylphthalate	8.00E-01	8.00E-01	8.00E-01	1.00E+01	0.10	1						
Di-n-butylphthalate	1.00E+01	1.00E+01	1.00E+01	1.00E+01	0.10	1	2.96E-12	0.000	1.95E-12	0.000	5.63E-14	0.000
Di-n-octylphthalate	2.00E-02	2.00E-02	2.00E-02	9.13E-04	0.10	1	3.57E-12	0.000	2.36E-12	0.000	6.79E-14	0.000
Ethylbenzene	1.00E-01	1.00E-01	2.90E-01									
Famphur												
Fluoranthene	4.00E-02	4.00E-02	4.00E-02	4.00E-02	0.13	1						
Fluorene	4.00E-02	4.00E-02	4.00E-02	8.00E-04	0.10	1						
Hexachlorobenzene	8.00E-04	8.00E-04	8.00E-04	3.00E-04	0.10	1	4.70E-12	0.000	3.10E-12	0.000	8.93E-14	0.000
Hexachlorobutadiene	3.00E-04	3.00E-04	3.00E-04	1.20E-03	0.10	1						
Hexachloroethane	7.00E-03	7.00E-03	7.00E-03	2.00E-05	0.10	1						
Indeno[1,2,3-cd]pyrene	1.00E-03	1.00E-03	1.00E-03	1.00E-03	0.10	1						
Isobutyl alcohol	3.00E-01	3.00E-01	3.00E-01	2.00E-01	0.10	1						
Isophorone	2.00E-01	2.00E-01										
Kepone												
Methyl Acetate	1.00E+00	1.00E+00	1.00E+00	6.00E-02	0.10	1						
Methylene Chloride	6.00E-02	6.00E-02	6.00E-02	8.57E-01	0.10	1						
Naphthalene	2.00E-02	2.00E-02	2.00E-02	8.57E-04	0.10	1						

Table D-10. ICDF visitor scenario (treatment area)—potential noncarcinogenic risk.

Constituent	RfD <sub>o</sub> (mg/kg-day)	RfD <sub>d</sub> (mg/kg-day)	RfD <sub>i</sub> (mg/kg-day)	EPC (mg/kg)	ABS <sub>d</sub>	ABS <sub>ai</sub>	Ingestion		Dermal		Inhalation		% Total HI Contribution
							CDI (mg/kg-day)	HQ	CDI (mg/kg-day)	HQ	CDI (mg/kg-day)	HQ	
Nitrobenzene	5.00E-04	5.00E-04	5.71E-04	0.10	1	1							
N-Nitroso-di-n-propylamine													
N-Nitrosodiphenylamine	3.00E-02	3.00E-02	3.00E-02	2.24E-03	0.25	1	8.78E-12	0.000	1.45E-11	0.000	1.67E-13	0.000	0.00
Pentachlorophenol	3.00E-01	3.00E-01	3.00E-01	1.10E-01	3.59E-01	1	3.47E-12	0.000	2.29E-12	0.000	6.60E-14	0.000	0.00
Phenol	6.00E-01	6.00E-01	6.00E-01	8.87E-04	0.10	1							
Pyrene	3.00E-02	3.00E-02	3.00E-02	2.90E-01	2.90E-01	1	9.73E-12	0.000			8.58E-11	0.000	0.00
Styrene	2.00E-01	2.00E-01	1.00E-02	1.14E-01	2.49E-03	1	1.40E-09	0.000	1.04E-10	0.000	1.24E-08	0.000	0.00
Tetrachloroethene	1.00E-02	1.00E-02	1.00E-01	1.10E-01	3.59E-01	1					9.15E-10	0.000	0.00
Toluene	2.00E-01	2.00E-01	2.00E-01	1.10E-01	6.00E-03	2.65E-02	1	5.45E-12	0.000	3.96E-09	0.000	4.81E-11	0.000
Trichloroethene	6.00E-03	6.00E-03	6.00E-03	2.00E-01	1.39E-03	1	4.51E-05	0.000	2.23E-10	0.000	8.58E-07	0.001	17
Xylene (ortho)	2.00E+00	2.00E+00	2.00E+00	2.00E+00	1.01E+00	1					4.27E-12	0.000	0.0
Xylene (total)	2.00E+00	2.00E+00	2.00E+00	2.00E+00	1.40E-03	1.15E+04	0.15						
Aluminum	1.00E+00	1.00E+00	1.00E+00	5.74E-02	0.03	1	5.19E-08	0.000	1.03E-08	0.000	9.87E-10	0.000	5
Antimony	4.00E-04	6.00E-05	3.00E-04	1.33E+01	1.92E+02	0.07	7.50E-07	0.000	4.15E-09	0.000	1.43E-08	0.000	3
Arsenic	3.00E-04	3.00E-04	1.90E-03	1.43E-04	1.92E+02	0.07	0.007		2.39E-06	0.000	7.88E-11	0.000	0.4
Barium	7.00E-02	4.90E-02	1.40E-05	5.71E-06	1.06E+00	0.007	0.007		5.18E-09	0.000	4.54E-08	0.000	1
Beryllium	2.00E-03	1.40E-05	9.00E-02	5.71E-03	6.10E-02	1	0.025		1.42E-07	0.000	2.70E-09	0.000	0.3
Boron	9.00E-02	9.00E-02	2.50E-05	1.32E-00	0.00	0.03	1	4.35E-08	0.000	1.34E-11	0.000	8.26E-10	0.000
Cadmium	5.00E-04	6.00E-02	3.71E-02	3.41E+01	1.11E+01	1	1.34E-07	0.000	2.54E-09	0.000	7.33E-11	0.000	0.09
Chromium													
Cobalt	6.00E-02	6.00E-02	2.00E-02	8.57E-04	1								
Copper	3.71E-02	3.71E-02	2.00E-02	2.00E-01	2.00E-01	1							
Cyanide													
Dysprosium	2.00E-01	2.00E-01	2.00E-01	1.24E+01	1		4.86E-08	0.000			9.24E-10	0.000	0.02
Fluoride	6.00E-02	6.00E-02	3.00E-01	2.28E-04	1	8.91E-05	0.000				1.69E-06	0.000	8
Iron	3.00E-01	3.00E-01	1.44E-03	1.40E-05	4.14E-02	0.04	1.62E-06	0.000	9.79E-09	0.000	3.08E-08	0.002	60
Manganese	2.40E-02	1.44E-03	3.00E-04	2.10E-05	2.50E-00	0.07	1.32E-07	0.000	1.86E-10	0.000	2.51E-09	0.000	1
Mercury	3.00E-04	5.00E-03	5.00E-03	3.37E-01	4.21E+01	0.04	1.65E-07	0.000	8.50E-09	0.000	3.14E-09	0.000	0
Molybdenum	2.00E-02	8.00E-04	5.00E-03	2.17E+00	9.86E-01	0.04	3.86E-09	0.000			1.62E-10	0.000	0.04
Nickel	2.00E-02	8.00E-04	2.00E-04	4.59E+01	1.19E+02	1	4.65E-07	0.000			7.33E-11	0.000	0.02
Selenium	5.00E-03	5.00E-03	2.00E-04	8.09E-03	1	3.17E-11	0.000				6.02E-13	0.000	0.0
Silver	6.00E-01	6.00E-01	3.00E-01	4.59E+01	1.19E+01	1	1.79E-07	0.000	3.41E-09	0.000	3.41E-09	0.000	0.7
Strontium	6.60E-05	6.60E-05	7.00E-03	1.82E+04	3.00E-01	1	4.65E-07	0.000	8.85E-09	0.000	8.85E-09	0.000	0.0
Thallium													
Vanadium													
Zinc													
<b>Subtotal Hazard Indices</b>							0.0008		0.0005		0.003		100
												<b>Total HI = 0.004</b>	

Guide to Appendix D Table Abbreviations:

Table D-10. ICDF visitor scenario (treatment area)—potential noncarcinogenic risk.

Constituent	RfD <sub>o</sub> (mg/kg-day)	RfD <sub>d</sub> (mg/kg-day)	RfD <sub>i</sub> (mg/kg-day)	EPC (mg/kg)	Ingestion			Dermal			Inhalation		
					ABS <sub>d</sub>	ABS <sub>si</sub>	CDDI (mg/kg-day)	HQ	(mg/kg-day)	HQ	CDI (mg/kg-day)	HQ	Total HQ % Contribution
ABSd = Dermal Absorption Factor			SF = slope factor	SFD = Dermal Slope Factor									
ABSGi = Gastrointestinal Absorption Factor				SFI = Inhalation Slope Factor									
CDI = Chronic Daily Intake				SFO = Oral Slope Factor									
ELCR = Excess Lifetime Cancer Risk				URF = Inhalation Unit Risk Factor									
EPC = Exposure Point Concentration				WOE = Weight of Evidence									
HI = hazard index				Cancer WOE Classifications:									
HQ = hazard quotient				Group A: Human carcinogen.									
IC = Inhalation Concentration				Group B: Probably human carcinogen.									
NA = not available				B1 - indicates that limited human data are available.									
Rf <sub>c</sub> = Reference Concentration				B2 - indicates sufficient evidence in animals and inadequate or no evidence in humans.									
RfD <sub>d</sub> = Dermal Reference Dose				Group C: Possible human carcinogen.									
RfD <sub>i</sub> = Inhalation Reference Dose				Group D: Not classifiable.									
RfD <sub>o</sub> = Oral Reference Dose													

Table D-11. ICDF visitor scenario (evaporation pond berm)—potential excess lifetime cancer risk.

Constituent	SF <sub>i</sub>	WOE (mg/kg-day) <sup>-1</sup>	EPC (mg/kg)	Inhalation			% Contribution
				CDI (mg/kg-day)	ELCR (mg/kg-day)		
1,1,1-Trichloroethane	D	1.62E-03	1.29E-07				
1,1,2,2-Tetrachloroethane	C	2.03E-01	1.89E-16	1.51E-20	3E-21	0.00	
1,1,2-Trichloroethane	C	5.60E-02	3.57E-05	2.84E-09	2E-10	13.03	
1,1-Dichloroethane	C	7.11E-10	5.67E-14				
1,1-Dichloroethene	C	1.75E-01	1.15E-09	9.18E-14	2E-14	0.00	
1,2,4-Trichlorobenzene	D	1.06E-07	8.43E-12				
1,2-Dichlorobenzene	D	2.16E-115	1.72E-119				
1,2-Dichloroethane	B2	9.10E-02	1.38E-10	1.10E-14	1E-15	0.00	
1,2-Dichloroethene (total)			3.28E-07	2.62E-11			
1,3-Dichlorobenzene	D	2.20E-02	2.47E-07	1.97E-11			
1,4-Dichlorobenzene	C	6.86E-04	1.25E-05	9.97E-10	2E-11	2	
2-Butanone	D	7.35E-13	5.47E-08				
2-Choronaphthalene			5.86E-17				
2-Chlorophenol			2.58E-185				
2-Methylnaphthalene			3.23E-181				
2-Nitroaniline			4.07E-03	3.24E-07			
3-Nitroaniline			4.08E-03	3.25E-07			
4-Methyl-2-Pentanone			4.08E-03	3.25E-07			
4-Nitroaniline			4.08E-03	3.25E-07			
Acenaphthene	D	7.28E-14	5.80E-18				
Acenaphthylene	D	7.74E-11	6.17E-15				
Acetone	D	4.52E-114	3.60E-118				
Acetonitrile			4.11E-34	3.27E-38			
Acrolein	C	4.72E-38	3.76E-42				
Acrylonitrile	B1	2.38E-01	7.65E-27	6.10E-31	1E-31	0.00	
Anthracene	D		2.66E-11	2.12E-15			
Benzene	A	2.70E-02	8.54E-06	6.81E-10	2E-11	1.50	
bis(2-Chloroethyl)ether	B2	1.16E+00	2.35E-09	1.87E-13	2E-13	0.02	
bis(2-Chloroisopropyl)ether	C	3.50E-02	3.55E-10	2.83E-14	1E-15	0.00	
Carbon Disulfide			1.39E-296	1.11E-300			
Chlorobenzene	D	8.63E-09	6.88E-13				
Chloroethane			4.62E-51	3.68E-55	1E-57	0.00	
Chloromethane	C	6.30E-03	2.00E-03	1.60E-07	1E-09	82.31	
Dibenzofuran	D	1.66E-36	1.33E-40				

**Table D-11. ICDF visitor scenario (evaporation pond berm)—potential excess lifetime cancer risk.**

Constituent	WOE D	SF <sub>i</sub> (mg/kg·day) <sup>d</sup>	EPC (mg/kg)	Inhalation		%
				CDI (mg/kg·day)	ELCR Contribution	
Ethylbenzene	D	1.01E-09	8.02E-14			
Methyl Acetate	B2	1.65E-03	1.11E-05	8.85E-10		0.00
Methylene Chloride	C	2.47E-43	1.97E-47			
Naphthalene	B2	7.50E-17	5.98E-21			
Nitrobenzene	B2	2.32E-09	1.85E-13			
Styrene	C	3.15E-13	2.51E-17			
Tetrachloroethene	C-B2	2.03E-03	9.12E-06	7.27E-10	1E-12	0.12
Toluene	D	1.23E-31	9.78E-36			
Trichloroethene	B2	6.00E-03	3.11E-05	2.48E-09	1E-11	1.22
Xylene (ortho)	D	2.66E-22	2.12E-26			
Xylene (total)	D	2.36E-19	1.88E-23			
<b>Estimated Total Risk =</b>			1E-09	100		

**Guide to Appendix D Table Abbreviations:**

ABSD = Dermal Absorption Factor

ABSGi = Gastrointestinal Absorption Factor

CDI = Chronic Daily Intake

ELCR = Excess Lifetime Cancer Risk

EPC = Exposure Point Concentration

HI = hazard index

HQ = hazard quotient

IC = Inhalation Concentration

NA = not available

RfC = Reference Concentration

RfDd = Dermal Reference Dose

RfDi = Inhalation Reference Dose

RfDo = Oral Reference Dose

SF = slope factor

SFd = Dermal Slope Factor

Sfi = Inhalation Slope Factor

SFo = Oral Slope Factor

URF = Inhalation Unit Risk Factor

WOE = Weight of Evidence

Cancer WOE Classifications:

Group A: Human carcinogen.

Group B: Probably human carcinogen.

B1 - indicates that limited human data are available.

B2 - indicates sufficient evidence in animals and inadequate or no evidence in humans.

Group C: Possible human carcinogen.

Group D: Not classifiable.

**Table D-12. ICDF visitor scenario (evaporation pond berm)—potential noncarcinogenic risk.**

Constituent	RfD <sub>i</sub> (mg/kg-day)	EPC (mg/kg)	Inhalation		% Contribution
			CDI (mg/kg-day)	HQ	
1,1,1-Trichloroethane	2.86E-01	1.62E-03	6.03E-07	2.11E-06	0.00
1,1,2,2-Tetrachloroethane	6.00E-02	1.89E-16	7.04E-20	1.17E-18	0.00
1,1,2-Trichloroethane	4.00E-03	3.57E-05	1.33E-08	3.32E-06	0.00
1,1-Dichloroethane	1.43E-01	7.11E-10	2.65E-13	1.85E-12	0.00
1,1-Dichloroethene	9.00E-03	1.15E-09	4.29E-13	4.77E-11	0.00
1,2,4-Trichlorobenzene	5.70E-02	1.06E-07	3.94E-11	6.91E-10	0.00
1,2-Dichlorobenzene	5.71E-02	2.16E-115	8.05E-119	1.41E-117	0.00
1,2-Dichloroethane	1.40E-03	1.38E-10	5.14E-14	3.67E-11	0.00
1,2-Dichloroethene (total)	1.00E-02	3.28E-07	1.22E-10	1.22E-08	0.00
1,3-Dichlorobenzene	9.00E-04	2.47E-07	9.21E-11	1.02E-07	0.00
1,4-Dichlorobenzene	2.29E-01	1.25E-05	4.66E-09	2.03E-08	0.00
2-Butanone	2.86E-01	6.86E-04	2.55E-07	8.94E-07	0.00
2-Chloronaphthalene	8.00E-02	7.35E-13	2.73E-16	3.42E-15	0.00
2-Chlorophenol	5.00E-03	3.23E-181	1.20E-184	2.41E-182	0.00
2-Methylnaphthalene	2.00E-02	4.07E-03	1.51E-06	7.57E-05	0.09
2-Nitroaniline	5.71E-05	4.08E-03	1.52E-06	2.66E-02	33.29
3-Nitroaniline	5.71E-05	4.08E-03	1.52E-06	2.66E-02	33.29
4-Methyl-2-Pentanone	2.29E-02	1.32E-37	4.90E-41	2.15E-39	0.00
4-Nitroaniline	5.71E-05	4.08E-03	1.52E-06	2.66E-02	33.29
Acenaphthene	6.00E-02	7.28E-14	2.71E-17	4.52E-16	0.00
Acenaphthylene	6.00E-02	7.74E-11	2.88E-14	4.80E-13	0.00
Acetone	1.00E-01	4.52E-114	1.68E-117	1.68E-116	0.00
Acetonitrile	1.70E-02	4.11E-34	1.53E-37	9.00E-36	0.00
Acrolein	5.71E-06	4.72E-38	1.76E-41	3.07E-36	0.00
Acrylonitrile	5.71E-04	7.65E-27	2.85E-30	4.99E-27	0.00
Anthracene	3.00E-01	2.66E-11	9.89E-15	3.30E-14	0.00
Benzene	1.71E-03	8.54E-06	3.18E-09	1.86E-06	0.00
bis(2-Chloroethyl)ether		2.35E-09	8.74E-13		
bis(2-Chloroisopropyl)ether	4.00E-02	3.55E-10	1.32E-13	3.31E-12	0.00
Carbon Disulfide	2.00E-01	1.39E-296	5.19E-300	2.59E-299	0.00
Chlorobenzene	1.70E-02	8.63E-09	3.21E-12	1.89E-10	0.00
Chloroethane	2.86E+00	4.62E-51	1.72E-54	6.01E-55	0.00
Chloromethane	8.60E-02	2.00E-03	7.46E-07	8.67E-06	0.01
Dibenzofuran	4.00E-03	1.66E-36	6.19E-40	1.55E-37	0.00
Ethylbenzene	2.90E-01	1.01E-09	3.75E-13	1.29E-12	0.00

**Table D-12. ICDF visitor scenario (evaporation pond berm)—potential noncarcinogenic risk.**

Constituent	RfD <sub>i</sub> (mg/kg-day)	EPC (mg/kg)	Inhalation			% Contribution
			CDI	(mg/kg-day)	HQ	
Methyl Acetate	1.00E+00	1.11E-05	4.13E-09	4.13E-09	0.00	0.00
Methylene Chloride	8.57E-01	2.47E-43	9.20E-47	1.07E-46	0.00	
Naphthalene	8.57E-04	7.50E-17	2.79E-20	3.26E-17	0.00	
Nitrobenzene	5.71E-04	2.32E-09	8.64E-13	1.51E-09	0.00	
Styrene	2.90E-01	3.15E-13	1.17E-16	4.04E-16	0.00	
Tetrachloroethene	1.14E-01	9.12E-06	3.40E-09	2.98E-08	0.00	
Toluene	1.10E-01	1.23E-31	4.57E-35	4.15E-34	0.00	
Trichloroethene	6.00E-03	3.11E-05	1.16E-08	1.93E-06	0.00	
Xylene (ortho)	2.00E-01	2.66E-22	9.90E-26	4.95E-25	0.00	
Xylene (total)	2.00E-01	2.36E-19	8.80E-23	4.40E-22	0.00	
<b>Total HI =</b>			0.080	100		

**Guide to Appendix D Table Abbreviations:**

ABSD = Dermal Absorption Factor

ABSGi = Gastrointestinal Absorption Factor

CDI = Chronic Daily Intake

ELCR = Excess Lifetime Cancer Risk

EPC = Exposure Point Concentration

HI = hazard index

HQ = hazard quotient

IC = Inhalation Concentration

NA = not available

Rf<sub>C</sub> = Reference Concentration

RfD<sub>d</sub> = Dermal Reference Dose

RfD<sub>i</sub> = Inhalation Reference Dose

RfD<sub>o</sub> = Oral Reference Dose

SF = slope factor

SF<sub>d</sub> = Dermal Slope Factor

Sf<sub>i</sub> = Inhalation Slope Factor

SF<sub>o</sub> = Oral Slope Factor

URF = Inhalation Unit Risk Factor

WOE = Weight of Evidence

Cancer WOE Classifications:

Group A: Human carcinogen.

Group B: Probably human carcinogen.

B1 - indicates that limited human data are available.  
B2 - indicates sufficient evidence in animals and inadequate or no evidence in humans.

Group C: Possible human carcinogen.

Group D: Not classifiable.

Table D-13. CFA office worker scenario—potential excess lifetime cancer risk.

Constituent	WOE	Sfi (mg/kg-day) <sup>-1</sup>	EPC (mg/kg)	Inhalation		% Contribution
				CDI (mg/kg-day)	ELCR	
1,1,1-Trichloroethane	D	4.97E-09	1.17E-14			
1,1,2,2-Tetrachloroethane	C	2.03E-01	1.57E-11	3.69E-17	7E-18	0.00
1,1,2-Trichloroethane	C	5.60E-02	7.67E-11	1.81E-16	1E-17	0.00
1,1-Dichloroethane	C	7.42E-10	1.75E-15			
1,1-Dichloroethene	C	1.75E-01	4.69E-10	1.10E-15	2E-16	0.01
1,2,4-Trichlorobenzene	D	3.61E-09	6.79E-15			
1,2-Dichlorobenzene	D	3.61E-09	8.49E-15			
1,2-Dichloroethane	B2	9.10E-02	1.71E-12	4.01E-18	4E-19	0.00
1,2-Dichloroethene (total)	D	1.03E-10	2.42E-16			
1,3-Dichlorobenzene	C	2.20E-02	1.43E-07	3.36E-13	7E-15	0.2
1,4-Dichlorobenzene	B2	1.10E-02	5.96E-12	3.02E-20	3E-22	0.00
1,4-Dioxane						
2,4,5-Trichlorophenol	B2	1.09E-02	1.41E-08	7.17E-17		
2,4,6-Trichlorophenol						
2,4-Dichlorophenol						
2,4-Dimethylphenol						
2,4-Dinitrophenol	B2	5.79E-09	2.94E-17	3E-19	0.00	
2,4-Dinitrotoluene	B2	6.85E-09	3.47E-17			
2,6-Dinitrotoluene	B2	7.83E-09	2.94E-17			
2-Butanone	D					
2-Chloronaphthalene						
2-Chlorophenol						
2-Hexanone						
2-Methylnaphthalene						
2-Methylphenol	C					
2-Nitroaniline						
2-Nitrophenol						
3,3'-Dichlorobenzidine	B2	4.50E-01	3.61E-09	1.83E-17	8E-18	0.00
3-Nitroaniline						
4,6-Dinitro-2-methylphenol						
4-Chloroaniline						
4-Methyl-2-Pentanone	C					
4-Methylphenol						
4-Nitroaniline	D					
4-Nitrophenol						

**Table D-13. CFA office worker scenario—potential excess lifetime cancer risk.**

Constituent	WOE	Sf <sub>i</sub> (mg/kg-day) <sup>-1</sup>	EPC (mg/kg)	Inhalation		% Contribution
				CDI	ELCR	
Acenaphthene	D	6.41E-08	2.85E-14			
Acenaphthylene	D	6.56E-09	3.91E-15			
Acetone	D	1.97E-07	4.63E-13			
Acetonitrile	C	5.96E-12	1.03E-17			
Acrolein	B1	2.87E-12	6.76E-18			
Acrylonitrile	D	2.38E-01	2.87E-12	6.76E-18	2E-18	0.00
Anthracene	B2	2.49E-02	3.63E-11	1.84E-19	5E-21	0.00
Aramite	B2	7.00E-02	2.44E-09	1.24E-17	9E-19	0.00
Aroclor-1016	B2	2.00E+00	4.07E-08	2.06E-16	4E-16	0.0
Aroclor-1254	B2	2.00E+00	2.28E-07	1.16E-15	2E-15	0
Aroclor-1260	B2	2.00E+00	1.97E-08	1.00E-16	2E-16	0.0
Aroclor-1268	A	2.70E-02	1.91E-07	4.50E-13	1E-14	0.4
Benzene	A	2.30E+02	9.21E-11	4.67E-19	1E-16	0.0
Benzidine	B2	3.10E-01	8.02E-08	4.07E-16	1E-16	0.0
Benzo(a)anthracene	B2	3.10E+00	3.32E-08	1.69E-16	5E-16	0.0
Benzo(a)pyrene	B2	3.10E-01	5.69E-08	2.89E-16	9E-17	0.0
Benzo(b)fluoranthene	B2	3.10E-02	5.90E-09	2.99E-17	9E-19	0.00
Benzo(g,h,i)perylene	D	3.61E-09	1.83E-17			
Benzo(k)fluoranthene	B2	3.10E-02	5.90E-09	2.99E-17	9E-19	0.00
Benzoic acid	D	2.71E-09	1.38E-17			
bis(2-Chloroethyl)ether	B2	1.16E+00	3.61E-09	3.61E-15	4E-15	0.1
bis(2-Chloroisopropyl)ether	C	3.50E-02	3.61E-09	8.49E-15	3E-16	0.01
bis(2-Ethyhexyl)phthalate	B2	1.40E-02	4.66E-08	2.37E-16	3E-18	0.00
Butylbenzylphthalate	C	2.15E-08	1.09E-16			
Carbazole	B2	2.00E-02	1.03E-08	5.20E-17	1E-18	0.00
Carbon Disulfide	D	1.44E-08	3.40E-14			
Chlorobenzene	D	2.90E-03	9.56E-13	2.25E-18	7E-21	0.00
Chloroethane	C	6.30E-03	1.12E-10	2.63E-16	2E-18	0.00
Chloromethane	B2	3.10E-03	8.41E-08	4.26E-16	1E-18	0.00
Chrysene	B2	3.10E+00	3.61E-09	1.83E-17	6E-17	0.0
Dibenz(a,h)anthracene	D	1.03E-07	1.31E-14			
Dibenzofuran	D	3.61E-09	1.83E-17			
Diethylphthalate	D	3.61E-09	1.83E-17			
Dimethylphthalate	D	3.61E-09	1.83E-17			
Di-n-butylphthalate	D	7.56E-09	3.84E-17			

Table D-13. CFA office worker scenario—potential excess lifetime cancer risk.

Constituent	WOE	Sf <sub>i</sub> (mg/kg-day) <sup>-1</sup>	Inhalation		ELCR	% Contribution
			EPC (mg/kg)	CDI (mg/kg-day)		
Di-n-octylphthalate	D	8.31E-09	4.22E-17			
Ethylbenzene	D	2.48E-08	5.82E-14			
Famphur	D	1.84E-11	9.34E-20			
Fluoranthene	D	2.42E-07	1.23E-15			
Fluorene	D	5.82E-08	2.95E-16			
Hexachlorobenzene	B2	1.61E+00	3.61E-09	1.83E-17	3E-17	0.00
Hexachlorobutadiene	C	7.80E-02	6.56E-09	3.33E-17	3E-18	0.00
Hexachlorocyclopentadiene	D	3.61E-09	1.83E-17			
Hexachloroethane	C	1.40E-02	3.61E-09	1.83E-17	3E-19	0.00
Indeno(1,2,3-cd)pyrene	B2	3.10E-01	3.61E-09	1.83E-17	6E-18	0.00
Isobutyl alcohol			5.96E-12	3.02E-20		
Isophorone	C	9.50E-04	3.61E-09	1.83E-17	2E-20	0.00
Kepone		1.80E+01	3.14E-08	1.60E-16	3E-15	0
Methyl Acetate			1.53E-10	2.55E-16		
Methylene Chloride	B2	1.65E-03	2.65E-08	6.24E-14	1E-16	0.00
Naphthalene	C	1.35E-07	2.43E-13			
Nitrobenzene	B2	3.61E-09	4.48E-15			
N-Nitroso-di-n-propylamine	B2	7.00E+00	3.61E-09	1.83E-17	1E-16	0.0
N-Nitrosodiphenylamine	B2	4.90E-03	3.61E-09	1.83E-17	9E-20	0.00
Pentachlorophenol	B2	1.20E-01	1.77E-08	8.99E-17	1E-17	0.00
Phenanthrene	D	3.70E-07	1.88E-15			
Phenol	D	2.53E-08	1.28E-16			
Pyrene	D	8.03E-08	4.07E-16			
Styrene	C	3.25E-13	7.65E-19			
Tetrachloroethene	C-B2	2.03E-03	3.05E-09	7.19E-15	1E-17	0.00
Toluene	D	3.11E-07	7.33E-13			
Trichloroethene	B2	6.00E-03	2.28E-08	5.37E-14	3E-16	0.01
Xylene (ortho)			1.23E-09	2.90E-15		
Xylene (total)	D	1.10E-06	2.58E-12			
Aluminum		2.24E-03	1.14E-11			
Antimony	D	1.85E-06	9.37E-15			
Arsenic	A	1.51E+01	1.79E-06	9.09E-15	1E-13	5
Barium	D	5.69E-05	2.89E-13			
Beryllium	B1	8.40E+00	9.11E-08	4.62E-16	4E-15	0
Boron	D	5.85E-05	2.97E-13			

Table D-13. CFA office worker scenario—potential excess lifetime cancer risk.

Constituent	WOE	$S_fi$ (mg/kg-day) <sup>-1</sup>	Inhalation			% Contribution
			EPC (mg/kg)	CDI (mg/kg-day)	ELCR	
Cadmium	B1	6.30E+00	1.14E-06	5.77E-15	4E-14	1
Chromium	A	4.20E+01	1.30E-05	6.62E-14	3E-12	93
Cobalt	D		1.91E-06	9.70E-15		
Copper			9.48E-06	4.81E-14		
Cyanide			1.07E-07	5.41E-16		
Dysprosium			1.88E-05	9.54E-14		
Fluoride			1.23E-06	6.22E-15		
Iron			3.25E-03	1.65E-11		
Manganese	D		6.55E-05	3.32E-13		
Mercury	D		2.99E-06	1.52E-14		
Molybdenum			3.23E-06	1.64E-14		
Nickel	D		6.23E-06	3.16E-14		
Selenium	D		2.68E-07	1.36E-15		
Silver	D		3.12E-06	1.58E-14		
Strontrium			5.77E-06	2.93E-14		
Thallium	D		1.17E-07	5.95E-16		
Vanadium			6.74E-06	3.42E-14		
Zinc	D		6.59E-05	3.34E-13		
<b>Estimated Total Risk =</b>					3E-12	100

Guide to Appendix D Table Abbreviations:

- ABSD = Dermal Absorption Factor
- ABSgi = Gastrointestinal Absorption Factor
- CDI = Chronic Daily Intake
- ELCR = Excess Lifetime Cancer Risk
- EPC = Exposure Point Concentration
- HI = hazard index
- HQ = hazard quotient
- IC = Inhalation Concentration
- NA = not available
- Rf<sub>C</sub> = Reference Concentration
- SF = slope factor
- SFd = Dermal Slope Factor
- Sfi = Inhalation Slope Factor
- SFo = Oral Slope Factor
- URF = Inhalation Unit Risk Factor
- WOE = Weight of Evidence
- Cancer WOE Classifications:
  - Group A: Human carcinogen.
  - Group B: Probably human carcinogen.
  - B1 - indicates that limited human data are available.

Table D-13. CFA office worker scenario—potential excess lifetime cancer risk.

Constituent	WOE	$S_{fi}$ $(\text{mg/kg-day})^{-1}$	EPC $(\text{mg/kg})$	Inhalation		ELCR	Contribution %
				CDI $(\text{mg/kg-day})$	%		
RfD <sub>d</sub> = Dermal Reference Dose			B2 - indicates sufficient evidence in animals and inadequate or no evidence in humans.				
RfD <sub>i</sub> = Inhalation Reference Dose			Group C: Possible human carcinogen.				
RfD <sub>o</sub> = Oral Reference Dose			Group D: Not classifiable.				

Table D-14. CFA office worker scenario—potential noncarcinogenic risk.

Constituent	RfD <sub>i</sub> (mg/kg-day)	EPC (mg/kg)	Inhalation			% Contribution
			CDI (mg/kg-day)	HQ	%	
1,1,1-Trichloroethane	2.86E-01	4.97E-09	5.46E-14	1.91E-13	0.00	0.00
1,1,2,2-Tetrachloroethane	6.00E-02	1.57E-11	1.72E-16	2.87E-15	0.00	0.00
1,1,2-Trichloroethane	4.00E-03	7.67E-11	8.43E-16	2.11E-13	0.00	0.00
1,1-Dichloroethane	1.43E-01	7.42E-10	8.15E-15	5.70E-14	0.00	0.00
1,1-Dichloroethene	9.00E-03	4.69E-10	5.15E-15	5.72E-13	0.00	0.00
1,2,4-Trichlorobenzene	5.70E-02	3.61E-09	3.17E-14	5.56E-13	0.00	0.00
1,2-Dichlorobenzene	5.71E-02	3.61E-09	3.96E-14	6.93E-13	0.00	0.00
1,2-Dichloroethane	1.40E-03	1.71E-12	1.87E-17	1.34E-14	0.00	0.00
1,2-Dichloroethene (total)	1.00E-02	1.03E-10	1.13E-15	1.13E-13	0.00	0.00
1,3-Dichlorobenzene	9.00E-04	3.61E-09	3.96E-14	4.40E-11	0.03	0.03
1,4-Dichlorobenzene	2.29E-01	1.43E-07	1.57E-12	6.84E-12	0.00	0.00
1,4-Dioxane						
2,4,5-Trichlorophenol	1.00E-01	1.41E-08	3.35E-16	3.35E-15	0.00	0.00
2,4,6-Trichlorophenol						
2,4-Dichlorophenol	3.00E-03	6.85E-09	1.62E-16	5.40E-14	0.00	0.00
2,4-Dimethylphenol	2.00E-02	5.79E-09	1.37E-16	6.85E-15	0.00	0.00
2,4-Dinitrophenol	2.00E-03	1.61E-08	3.82E-16	1.91E-13	0.00	0.00
2,4-Dinitrotoluene	2.00E-03	3.61E-09	8.54E-17	4.27E-14	0.00	0.00
2,6-Dinitrotoluene	1.00E-03	6.56E-09	1.55E-16	1.55E-13	0.00	0.00
2-Butanone	2.86E-01	7.83E-09	6.46E-14	2.26E-13	0.00	0.00
2-Chloronaphthalene	8.00E-02	3.61E-09	1.65E-14	2.07E-13	0.00	0.00
2-Chlorophenol	5.00E-03	5.79E-09	6.36E-14	1.27E-11	0.01	0.01
2-Hexanone	1.40E-03	8.55E-10	2.02E-17	1.45E-14	0.00	0.00
2-Methylnaphthalene						
2-Methylphenol	5.00E-02	6.54E-09	1.55E-16	3.10E-15	0.00	0.00
2-Nitroaniline	5.71E-05	8.62E-09	9.47E-14	1.66E-09	1.0	1.0
2-Nitrophenol	8.00E-03	5.79E-09	1.37E-16	1.71E-14	0.00	0.00
3,3'-Dichlorobenzidine						
3-Nitroaniline	5.71E-05	8.62E-09	9.47E-14	1.66E-09	1.0	1.0
4,6-Dinitro-2-methylphenol	2.00E-03	1.41E-08	3.35E-16	1.67E-13	0.00	0.00
4-Chloroaniline	4.00E-03	1.29E-08	3.06E-16	7.65E-14	0.00	0.00
4-Methyl-2-Pentanone	2.29E-02	9.39E-09	1.03E-13	4.51E-12	0.00	0.00
4-Methylphenol	5.00E-03	1.22E-08	2.89E-16	5.79E-14	0.00	0.00
4-Nitroaniline	5.71E-05	8.62E-09	9.47E-14	1.66E-09	1.0	1.0
4-Nitrophenol	8.00E-03	1.63E-08	3.87E-16	4.84E-14	0.00	0.00

Table D-14. CFA office worker scenario—potential noncarcinogenic risk.

Constituent	RfD <sub>i</sub> (mg/kg-day)	Inhalation			Contribution %
		EPC (mg/kg)	CDI (mg/kg-day)	HQ	
Acenaphthene	6.00E-02	6.41E-08	1.33E-13	2.21E-12	0.00
Aceraphthylene	6.00E-02	6.56E-09	1.83E-14	3.04E-13	0.00
Acetone	1.00E-01	1.97E-07	2.16E-12	2.16E-11	0.01
Acetonitrile	1.70E-02	5.96E-12	4.81E-17	2.83E-15	0.00
Acrolein	5.71E-06	2.87E-12	3.15E-17	5.52E-12	0.00
Acrylonitrile	5.71E-04	2.87E-12	3.15E-17	5.52E-14	0.00
Anthracene	3.00E-01	1.02E-07	5.70E-14	1.90E-13	0.00
Aramite	5.00E-02	3.63E-11	8.59E-19	1.72E-17	0.00
Aroclor-1016	7.00E-05	2.44E-09	5.77E-17	8.24E-13	0.00
Aroclor-1254	2.00E-05	4.07E-08	9.63E-16	4.82E-11	0.0
Aroclor-1260		2.28E-07	5.41E-15		
Aroclor-1268		1.97E-08	4.66E-16		
Benzene	1.71E-03	1.91E-07	2.10E-12	1.23E-09	0.7
Benzidine	3.00E-03	9.21E-11	2.18E-18	7.27E-16	0.00
Benzo(a)anthracene		8.02E-08	1.90E-15		
Benzo(a)pyrene		3.32E-08	7.87E-16		
Benzo(b)fluoranthene		5.69E-08	1.35E-15		
Benzo(g,h,i)perylene	3.00E-02	3.61E-09	8.54E-17	2.85E-15	0.00
Benzo(k)fluoranthene		5.90E-09	1.40E-16		
Benzoic acid	4.00E+00	2.71E-09	6.42E-17	1.61E-17	0.00
bis(2-Chloroethyl)ether		3.61E-09	1.68E-14		
bis(2-Chloroisopropyl)ether	4.00E-02	3.61E-09	3.96E-14	9.90E-13	0.00
bis(2-Ethylhexyl)phthalate	2.20E-02	4.66E-08	1.10E-15	5.02E-14	0.00
Butylbenzylphthalate	2.00E-01	2.15E-08	5.10E-16	2.55E-15	0.00
Carbazole		1.03E-08	2.43E-16		
Carbon Disulfide	2.00E-01	1.44E-08	1.59E-13	7.93E-13	0.00
Chlorobenzene	1.70E-02	2.08E-09	2.29E-14	1.35E-12	0.00
Chloroethane	2.86E+00	9.56E-13	1.05E-17	3.68E-18	0.00
Chlormethane	8.60E-02	1.12E-10	1.23E-15	1.43E-14	0.00
Chrysene		8.41E-08	1.99E-15		
Dibenz(a,h)anthracene		3.61E-09	8.54E-17		
Dibenzofuran	4.00E-03	1.03E-07	6.12E-14	1.53E-11	0
Diethylphthalate	8.00E-01	3.61E-09	8.54E-17	1.07E-16	0.00
Dimethylphthalate	1.00E+01	3.61E-09	8.54E-17	8.54E-18	0.00
Di-n-butylphthalate	1.00E-01	7.56E-09	1.79E-16	1.79E-15	0.00

Table D-14. CFA office worker scenario—potential noncarcinogenic risk.

Constituent	RfD <sub>i</sub> (mg/kg-day)	Inhalation			% Contribution
		EPC (mg/kg)	CDI (mg/kg-day)	HQ	
Di-n-octylphthalate	2.00E-02	8.31E-09	1.97E-16	9.84E-15	0.00
Ethylbenzene	2.90E-01	2.48E-08	2.72E-13	9.37E-13	0.00
Famphur		1.84E-11	4.36E-19		
Fluoranthene	4.00E-02	2.42E-07	5.72E-15	1.43E-13	0.00
Fluorene	4.00E-02	5.82E-08	1.38E-15	3.44E-14	0.00
Hexachlorobenzene	8.00E-04	3.61E-09	8.54E-17	1.07E-13	0.00
Hexachlorobutadiene	3.00E-04	6.56E-09	1.55E-16	5.17E-13	0.00
Hexachlorocyclopentadiene	2.00E-05	3.61E-09	8.54E-17	4.27E-12	0.00
Hexachloroethane	1.00E-03	3.61E-09	8.54E-17	8.54E-14	0.00
Indeno(1,2,3-cd)pyrene		3.61E-09	8.54E-17		
Isobutyl alcohol	3.00E-01	5.96E-12	1.41E-19	4.70E-19	0.00
Isophorone	2.00E-01	3.61E-09	8.54E-17	4.27E-16	0.00
Kepone		3.14E-08	7.44E-16		
Methyl Acetate	1.00E+00	1.53E-10	1.19E-15	1.19E-15	0.00
Methylene Chloride	8.57E-01	2.65E-08	2.91E-13	3.40E-13	0.00
Naphthalene	8.57E-04	1.35E-07	1.13E-12	1.32E-09	0.8
Nitro benzene	5.71E-04	3.61E-09	2.09E-14	3.66E-11	0.02
N-Nitroso-di-n-propylamine		3.61E-09	8.54E-17		
Pentachlorophenol	3.00E-02	1.77E-08	4.19E-16	1.40E-14	0.00
Phenanthrene	3.00E-01	3.70E-07	8.77E-15	2.92E-14	0.00
Phenol	6.00E-01	2.53E-08	5.99E-16	9.98E-16	0.00
Pyrene	3.00E-02	8.03E-08	1.90E-15	6.33E-14	0.00
Styrene	2.90E-01	3.25E-13	3.57E-18	1.23E-17	0.00
Tetrachloroethene	1.14E-01	3.05E-09	3.35E-14	2.94E-13	0.00
Toluene	1.10E-01	3.11E-07	3.42E-12	3.11E-11	0.02
Trichloroethene	6.00E-03	2.28E-08	2.51E-13	4.18E-11	0.03
Xylene (ortho)	2.00E-01	1.23E-09	1.35E-14	6.76E-14	0.00
Xylene (total)	2.00E-01	1.10E-06	1.20E-11	6.01E-11	0.04
Aluminum	1.40E-03	2.24E-03	5.31E-11	3.79E-08	23
Antimony		1.83E-06	4.37E-14		
Arsenic		1.79E-06	4.24E-14		
Barium	1.43E-04	5.69E-05	1.35E-12	9.43E-09	6
Beryllium	5.71E-06	9.11E-08	2.16E-15	3.78E-10	0.2
Boron	5.71E-03	5.85E-05	1.38E-12	2.42E-10	0

**Table D-14. CFA office worker scenario—potential noncarcinogenic risk.**

Constituent	RfD <sub>i</sub> (mg/kg/day)	EPC (mg/kg)	Inhalation		% Contribution
			CDI (mg/kg-day)	HQ	
Cadmium	1.14E-06	2.69E-14			
Chromium	1.30E-05	3.09E-13			
Cobalt	1.91E-06	4.53E-14			
Copper	9.48E-06	2.24E-13			
Cyanide	8.57E-04	1.07E-07	2.53E-15	2.95E-12	0.00
Dysprosium	1.88E-05	4.45E-13			
Fluoride	1.23E-06	2.90E-14			
Iron	3.25E-03	7.69E-11			
Manganese	1.40E-05	6.55E-05	1.55E-12	1.11E-07	66
Mercury	2.99E-06	7.09E-14			
Molybdenum	3.23E-06	7.64E-14			
Nickel	6.23E-06	1.47E-13			
Selenium	2.68E-07	6.35E-15			
Silver	3.12E-06	7.38E-14			
Strontium	5.77E-06	1.37E-13			
Thallium	1.17E-07	2.78E-15			
Vanadium	6.74E-06	1.59E-13			
Zinc	6.59E-05	1.56E-12			
<b>Total HI</b>				0.0000002	100

Guide to Appendix D Table Abbreviations:

- ABSD = Dermal Absorption Factor
- ABSgi = Gastrointestinal Absorption Factor
- CDI = Chronic Daily Intake
- ELCR = Excess Lifetime Cancer Risk
- EPC = Exposure Point Concentration
- HI = hazard index
- HQ = hazard quotient
- IC = Inhalation Concentration
- NA = not available
- SF = slope factor
- SFd = Dermal Slope Factor
- Sfi = Inhalation Slope Factor
- SFo = Oral Slope Factor
- URF = Inhalation Unit Risk Factor
- WOE = Weight of Evidence
- Cancer WOE Classifications:
- Group A: Human carcinogen.
- Group B: Probably human carcinogen.

**Table D-14. CFA office worker scenario—potential noncarcinogenic risk.**

Constituent	RfD <sub>I</sub> (mg/kg-day)	EPC (mg/kg)	Inhalation				
			CDI (mg/kg-day)	HQ	% Contribution		
<i>RfC = Reference Concentration</i>							
<i>B1 - indicates that limited human data are available.</i>							
<i>B2 - indicates sufficient evidence in animals and inadequate or no evidence in humans.</i>							
<i>Group C: Possible human carcinogen.</i>							
<i>Group D: Not classifiable.</i>							

RfDd = Dermal Reference Dose

RfDi = Inhalation Reference Dose

RfDo = Oral Reference Dose

**Table D-15.** Delivery driver scenario (100 m from ICDF Landfill)—potential excess lifetime cancer risk.

Constituent	WOE	Sf <sub>i</sub> (mg/kg-day) <sup>-1</sup>	EPC (mg/kg)	Inhalation		% Contribution
				CDI	ELCR (mg/kg-day)	
1,1,1-Trichloroethane	D	3.09E-06	4.57E-12			
1,1,2,2-Tetrachloroethane	C	9.74E-09	1.44E-14	3E-15	0.00	
1,1,2-Trichloroethane	C	5.60E-02	4.77E-08	7.05E-14	4E-15	0.00
1,1-Dichloroethane	C	1.75E-01	4.61E-07	6.82E-13		
1,1-Dichloroethene	C	2.91E-07	4.31E-13	8E-14		0.01
1,2,4-Trichlorobenzene	D	2.24E-06	2.65E-12			
1,2-Dichlorobenzene	D	2.24E-06	3.32E-12			
1,2-Dichloroethane	B2	9.10E-02	1.06E-09	1.57E-15	1E-16	0.00
1,2-Dichloroethene (total)		6.39E-08	9.45E-14			
1,3-Dichlorobenzene	D	2.24E-06	3.32E-12			
1,4-Dichlorobenzene	C	2.20E-02	8.87E-05	1.31E-10	3E-12	0.2
1,4-Dioxane	B2	1.10E-02	3.70E-09	1.18E-17	1E-19	0.00
2,4,5-Trichlorophenol		8.79E-06	2.80E-14			
2,4,6-Trichlorophenol	B2	1.09E-02	3.60E-06	1.15E-14	1E-16	0.00
2,4-Dichlorophenol		4.25E-06	1.36E-14			
2,4-Dimethylphenol		3.60E-06	1.15E-14			
2,4-Dinitrophenol		1.00E-05	3.20E-14			
2,4-Dinitrotoluene	B2	2.24E-06	7.15E-15			
2,6-Dinitrotoluene	B2	4.07E-06	1.30E-14			
2-Butanone	D	4.87E-06	5.41E-12			
2-Chloronaphthalene		2.24E-06	1.38E-12			
2-Chlorophenol		3.60E-06	5.32E-12			
2-Hexanone		5.31E-07	1.69E-15			
2-Methylnaphthalene		1.01E-04	2.69E-11			
2-Methylphenol	C	4.07E-06	1.30E-14			
2-Nitroaniline		5.36E-06	7.93E-12			
2-Nitrophenol		3.60E-06	1.15E-14			
3,3'-Dichlorobenzidine	B2	4.50E-01	2.24E-06	7.15E-15	3E-15	0.00
3-Nitroaniline		5.36E-06	7.93E-12			
4,6-Dinitro-2-methylphenol		8.79E-06	2.80E-14			
4-Chloraniline		8.04E-06	2.56E-14			
4-Methyl-2-Pentanone		5.84E-06	8.64E-12			
4-Methylphenol	C	7.60E-06	2.42E-14			
4-Nitroaniline	D	5.36E-06	7.93E-12			
4-Nitrophenol		1.02E-05	3.24E-14			
Acenaphthene		3.98E-05	1.11E-11			

Table D-15. Delivery driver scenario (100 m from ICDF Landfill)—potential excess lifetime cancer risk.

Constituent		WOE	Sfi (mg/kg-day) <sup>-1</sup>	EPC (mg/kg)	Inhalation		% Contribution
					CDI (mg/kg-day)	ELCR	
Acenaphthylene	D	4.07E-06	1.53E-12				
Acetone	D	1.22E-04	1.8E-10				
Acetonitrile	C	3.70E-09	4.03E-15				
Acrolein	B1	1.78E-09	2.64E-15				
Acrylonitrile	D	1.78E-09	2.64E-15	6E-16	0.00		
Anthracene	D	6.31E-05	4.77E-12				
Aramite	B2	2.49E-02	2.26E-08	7.19E-17	2E-18	0.00	
Aroclor-1016	B2	7.00E-02	1.51E-06	4.83E-15	3E-16	0.00	
Aroclor-1254	B2	2.00E+00	2.53E-05	8.06E-14	2E-13	0.0	
Aroclor-1260	B2	2.00E+00	1.42E-04	4.53E-13	9E-13	0	
Aroclor-1268	B2	2.00E+00	1.22E-05	3.90E-14	8E-14	0.0	
Benzene	A	2.70E-02	1.19E-04	1.76E-10	5E-12	0.4	
Benzidine	A	2.30E+02	5.72E-08	1.83E-16	4E-14	0.0	
Benzo(a)anthracene	B2	3.10E-01	4.98E-05	1.59E-13	5E-14	0.0	
Benzo(a)pyrene	B2	3.10E+00	2.07E-05	6.59E-14	2E-13	0.0	
Benzo(b)fluoranthene	B2	3.10E-01	3.54E-05	1.13E-13	3E-14	0.0	
Benzo(g,h,i)perylene	D	2.24E-06	7.15E-15				
Benzo(k)fluoranthene	B2	3.10E-02	3.66E-06	1.17E-14	4E-16	0.00	
Benzoic acid	D	1.69E-06	5.37E-15				
bis(2-Chloroethyl)ether	B2	1.16E+00	2.24E-06	1.41E-12	2E-12	0.1	
bis(2-Chloroisopropyl)ether	C	3.50E-02	2.24E-06	3.32E-12	1E-13	0.01	
bis(2-Ethylhexyl)phthalate	B2	1.40E-02	2.90E-05	9.24E-14	1E-15	0.00	
Butylbenzylphthalate	C	1.34E-05	4.27E-14				
Carbazole	B2	2.00E-02	6.37E-06	2.03E-14	4E-16	0.00	
Carbon Disulfide		8.97E-06	1.33E-11				
Chlorobenzene	D	1.29E-06	1.91E-12				
Chloroethane	C	5.94E-10	8.79E-16	3E-18	0.00		
Chloromethane	C	6.30E-03	6.95E-08	1.03E-13	6E-16	0.00	
Chrysene	B2	3.10E-03	5.22E-05	1.67E-13	5E-16	0.00	
Dibenz(a,h)anthracene	B2	3.10E+00	2.24E-06	7.15E-15	2E-14	0.0	
Dibenzofuran	D	6.39E-05	5.12E-12				
Diethylphthalate	D	2.24E-06	7.15E-15				
Dimethylphthalate	D	2.24E-06	7.15E-15				
Di-n-butylphthalate	D	4.70E-06	1.50E-14				
Di-n-octylphthalate	D	5.17E-06	1.65E-14				
Ethylbenzene	D	1.54E-05	2.28E-11				

Table D-15. Delivery driver scenario (100 m from ICDF Landfill)—potential excess lifetime cancer risk.

Constituent	WOE	Sfi	EPC (mg/kg-day) <sup>-1</sup>	Inhalation		% Contribution
				CDI (mg/kg-day)	ELCR	
Famphur			1.14E-08	3.65E-17		
Fluoranthene	D	1.50E-04	4.79E-13			
Fluorene	D	3.62E-05	1.15E-13			
Hexachlorobenzene	B2	2.24E-06	7.15E-15	1E-14	0.00	
Hexachlorobutadiene	C	4.07E-06	1.30E-14	1E-15	0.00	
Hexachlorocyclopentadiene	D	2.24E-06	7.15E-15			
Hexachloroethane	C	1.40E-02	2.24E-06	7.15E-15	1E-16	0.00
Indeno(1,2,3-cd)pyrene	B2	3.10E-01	2.24E-06	7.15E-15	2E-15	0.00
Isobutyl alcohol			3.70E-09	1.18E-17		
Isophorone	C	9.50E-04	2.24E-06	7.15E-15	7E-18	0.00
Kepone			1.80E+01	1.95E-05	6.23E-14	0
Methyl Acetate				9.54E-08	9.97E-14	
Methylene Chloride	B2	1.65E-03	1.65E-05	2.44E-11	4E-14	0.00
Naphthalene	C	8.38E-05	9.50E-11			
Nitrobenzene	B2	2.24E-06	1.75E-12			
N-Nitroso-di-n-propylamine	B2	7.00E+00	2.24E-06	7.15E-15	5E-14	0.0
N-Nitrosodiphenylamine	B2	4.90E-03	2.24E-06	7.15E-15	4E-17	0.00
Pentachlorophenol	B2	1.20E-01	1.10E-05	3.51E-14	4E-15	0.00
Phenanthrene	D		2.30E-04	7.34E-13		
Phenol	D		1.57E-05	5.01E-14		
Pyrene	D		4.99E-05	1.59E-13		
Styrene	C	2.02E-10	2.99E-16			
Tetrachloroethene	C-B2	2.03E-03	1.90E-06	2.81E-12	6E-15	0.00
Toluene	D	1.93E-04	2.86E-10			
Trichloroethene	B2	6.00E-03	1.42E-05	2.10E-11	1E-13	0.01
Xylene (ortho)	D		7.65E-07	1.13E-12		
Xylene (total)	D		6.80E-04	1.01E-09		
Aluminum	D		1.39E+00	4.45E-09		
Antimony	D		1.15E-03	3.66E-12		
Arsenic	A	1.51E+01	1.11E-03	3.55E-12	5E-11	5
Barium	D	3.54E-02	1.13E-10			
Beryllium	B1	8.40E+00	5.66E-05	1.80E-13	2E-12	0
Boron	D	3.64E-02	1.16E-10			
Cadmium	B1	6.30E+00	7.06E-04	2.25E-12	1E-11	1
Chromium	A	4.20E+01	8.11E-03	2.59E-11	1E-09	93
Cobalt			1.19E-03	3.79E-12		

**Table D-15. Delivery driver scenario (100 m from ICDF Landfill)—potential excess lifetime cancer risk.**

Constituent	WOE	Sf <sub>i</sub>	Inhalation			CDI	% Contribution
			(mg/kg-day) <sup>-1</sup>	EPC	(mg/kg-day)		
Copper	D	5.89E-03	1.88E-11				
Cyanide		6.63E-05	2.11E-13				
Dysprosium		1.17E-02	3.73E-11				
Fluoride		7.62E-04	2.43E-12				
Iron		2.02E+00	6.43E-09				
Manganese	D	4.07E-02	1.30E-10				
Mercury	D	1.86E-03	5.93E-12				
Molybdenum		2.01E-03	6.39E-12				
Nickel	D	3.87E-03	1.23E-11				
Selenium	D	1.67E-04	5.31E-13				
Silver	D	1.94E-03	6.18E-12				
Strontium		3.59E-03	1.14E-11				
Thallium	D	7.29E-05	2.33E-13				
Vanadium		4.19E-03	1.33E-11				
Zinc	D	4.10E-02	1.31E-10				
<b>Estimated Total Risk =</b>				1E-09	100		

Guide to Appendix D Table Abbreviations:

ABSd = Dermal Absorption Factor	SF = slope factor
ABSGi = Gastrointestinal Absorption Factor	SFd = Dermal Slope Factor
CDI = Chronic Daily Intake	Sfi = Inhalation Slope Factor
ELCR = Excess Lifetime Cancer Risk	SFo = Oral Slope Factor
EPC = Exposure Point Concentration	URF = Inhalation Unit Risk Factor
HI = hazard index	WOE = Weight of Evidence
HQ = hazard quotient	Cancer WOE Classifications:
IC = Inhalation Concentration	Group A: Human carcinogen.
NA = not available	Group B: Probably human carcinogen.
Rf <sub>C</sub> = Reference Concentration	B1 - indicates that limited human data are available.
RfDd = Dermal Reference Dose	B2 - indicates sufficient evidence in animals and inadequate or no evidence in humans.
RfDi = Inhalation Reference Dose	Group C: Possible human carcinogen.
RfDo = Oral Reference Dose	Group D: Not classifiable.

Table D-16. Delivery driver scenario (100 m from ICDF Complex)—potential noncarcinogenic risk.

Constituent	RfD <sub>i</sub> (mg/kg-day)	EPC (mg/kg)	Inhalation		% Contribution
			CDI (mg/kg-day)	HQ	
1,1,1-Trichloroethane	2.86E-01	3.09E-06	2.13E-11	7.47E-11	1.15E-04
1,1,2,2-Tetrachloroethane	6.00E-02	9.74E-09	6.73E-14	1.12E-12	1.72E-06
1,1,2-Trichloroethane	4.00E-03	4.77E-08	3.29E-13	8.23E-11	1.26E-04
1,1-Dichloroethane	1.43E-01	4.61E-07	3.18E-12	2.23E-11	3.42E-05
1,1-Dichloroethene	9.00E-03	2.91E-07	2.01E-12	2.24E-10	3.43E-04
1,2,4-Trichlorobenzene	5.70E-02	2.24E-06	1.24E-11	2.17E-10	3.34E-04
1,2-Dichlorobenzene	5.71E-02	2.24E-06	1.55E-11	2.71E-10	4.16E-04
1,2-Dichloroethane	1.40E-03	1.06E-09	7.32E-15	5.23E-12	8.03E-06
1,2-Dichloroethene (total)	1.00E-02	6.39E-08	4.41E-13	4.41E-11	6.77E-05
1,3-Dichlorobenzene	9.00E-04	2.24E-06	1.55E-11	1.72E-08	0.026
1,4-Dichlorobenzene	2.29E-01	8.87E-05	6.12E-10	2.67E-09	0.0041
1,4-Dioxane					
2,4,5-Trichlorophenol	1.00E-01	8.79E-06	1.31E-13	1.31E-12	2.01E-06
2,4,6-Trichlorophenol					
2,4-Dichlorophenol	3.00E-03	4.25E-06	5.35E-14	2.11E-11	3.24E-05
2,4-Dimethylphenol	2.00E-02	3.60E-06	5.35E-14	2.68E-12	4.11E-06
2,4-Dinitrophenol	2.00E-03	1.00E-05	1.49E-13	7.46E-11	1.15E-04
2,4-Dinitrotoluene	2.00E-03	2.24E-06	3.33E-14	1.67E-11	2.56E-05
2,6-Dinitrotoluene	1.00E-03	4.07E-06	6.06E-14	6.06E-11	9.31E-05
2-Butanone	2.86E-01	4.87E-06	2.52E-11	8.83E-11	1.36E-04
2-Chloronaphthalene	8.00E-02	2.24E-06	6.46E-12	8.08E-11	1.24E-04
2-Chlorophenol	5.00E-03	3.60E-06	2.48E-11	4.96E-09	0.0076
2-Hexanone	1.40E-03	5.31E-07	7.90E-15	5.65E-12	8.67E-06
2-Methylnaphthalene					
2-Methylphenol	5.00E-02	4.07E-06	6.05E-14	1.21E-12	1.86E-06
2-Nitroaniline	5.71E-05	5.36E-06	3.70E-11	6.47E-07	0.99
2-Nitrophenol	8.00E-03	3.60E-06	5.35E-14	6.69E-12	1.03E-05
3,3'-Dichlorobenzidine					
3-Nitroaniline	5.71E-05	5.36E-06	3.70E-11	6.47E-07	0.99
4,6-Dinitro-2-methylphenol	2.00E-03	8.79E-06	1.31E-13	6.54E-11	1.00E-04
4-Chloroaniline	4.00E-03	8.04E-06	1.20E-13	2.99E-11	4.59E-05
4-Methyl-2-Pentanone	2.29E-02	5.84E-06	4.03E-11	1.76E-09	0.0027
4-Methylphenol	5.00E-03	7.60E-06	1.13E-13	2.26E-11	3.47E-05
4-Nitroaniline	5.71E-05	5.36E-06	3.70E-11	6.47E-07	0.99
4-Nitrophenol	8.00E-03	1.02E-05	1.51E-13	1.89E-11	2.90E-05

Table D-16. Delivery driver scenario (100 nm from ICDF Complex)—potential noncarcinogenic risk.

Constituent	RfD <sub>i</sub> (mg/kg-day)	EPC (mg/kg)	Inhalation			% Contribution
			CDI (mg/kg-day)	HQ		
Acenaphthene	6.00E-02	3.98E-05	5.19E-11	8.65E-10		0.0013
Acenaphthylene	6.00E-02	4.07E-06	7.14E-12	1.19E-10		1.83E-04
Acetone	1.00E-01	1.22E-04	8.44E-10	8.44E-09	0.013	
Acetonitrile	1.70E-02	3.70E-09	1.88E-14	1.11E-12	1.70E-06	
Acrolein	5.71E-06	1.78E-09	1.23E-14	2.16E-09	0.0033	
Acrylonitrile	5.71E-04	1.78E-09	1.23E-14	2.16E-11	3.31E-05	
Anthracene	3.00E-01	6.31E-05	2.23E-11	7.42E-11	1.14E-04	
Aramite	5.00E-02	2.26E-08	3.36E-16	6.71E-15	1.03E-08	
Aroclor-1016	7.00E-05	1.51E-06	2.25E-14	3.22E-10	4.94E-04	
Aroclor-1254	2.00E-05	2.53E-05	3.76E-13	1.88E-08	0.029	
Aroclor-1260		1.42E-04	2.11E-12			
Aroclor-1268		1.22E-05	1.82E-13			
Benzene	1.71E-03	1.19E-04	8.20E-10	4.80E-07	0.74	
Benzidine	3.00E-03	5.72E-08	8.52E-16	2.84E-13	4.36E-07	
Benzo(a)anthracene		4.98E-05	7.42E-13			
Benzo(a)pyrene		2.07E-05	3.07E-13			
Benzo(b)fluoranthene		3.54E-05	5.26E-13			
Benzo(g,h,i)perylene	3.00E-02	2.24E-06	3.33E-14	1.11E-12	1.71E-06	
Benzo(k)fluoranthene		3.66E-06	5.45E-14			
Benzoic acid	4.00E+00	1.69E-06	2.51E-14	6.27E-15	9.63E-09	
bis(2-Chloroethyl)ether		2.24E-06	6.57E-12			
bis(2-Chloroisopropyl)ether	4.00E-02	2.24E-06	1.55E-11	3.87E-10	5.94E-04	
bis(2-Ethylhexyl)phthalate	2.20E-02	2.90E-05	4.31E-13	1.96E-11	3.01E-05	
Butylbenzylphthalate	2.00E-01	1.34E-05	1.99E-13	9.95E-13	1.53E-06	
Carbazole		6.37E-06	9.48E-14			
Carbon Disulfide	2.00E-01	8.97E-06	6.19E-11	3.10E-10	4.76E-04	
Chlorobenzene	1.70E-02	1.29E-06	8.94E-12	5.26E-10	8.07E-04	
Chloroethane	2.86E+00	5.94E-10	4.10E-15	1.44E-15	2.21E-09	
Chloromethane	8.60E-02	6.95E-08	4.80E-13	5.58E-12	8.57E-06	
Chrysene		5.22E-05	7.77E-13			
Dibenz(a,h)anthracene		2.24E-06	3.33E-14			
Dibenzo(furan	4.00E-03	6.39E-05	2.39E-11	5.98E-09	0.0092	
Diethylphthalate	8.00E-01	2.24E-06	3.34E-14	4.17E-14	6.41E-08	
Dimethylphthalate	1.00E+01	2.24E-06	3.33E-14	3.33E-15	5.12E-09	
Di-n-butylphthalate	1.00E-01	4.70E-06	6.99E-14	6.99E-13	1.07E-06	

Table D-16. Delivery driver scenario (100 m from ICDF Complex)—potential noncarcinogenic risk.

Constituent	RF <sub>i</sub> (mg/kg-day)	EPC (mg/kg)	Inhalation		Contribution %
			CDI (mg/kg-day)	HQ	
Di-n-octylphthalate	2.00E-02	5.17E-06	7.69E-14	3.84E-12	5.90E-06
Ethylbenzene	2.90E-01	1.54E-05	1.06E-10	3.66E-10	5.62E-04
Famphur		1.14E-08	1.70E-16		
Fluoranthene	4.00E-02	1.50E-04	2.23E-12	5.59E-11	8.58E-05
Fluorene	4.00E-02	3.62E-05	5.38E-13	1.35E-11	2.07E-05
Hexachlorobenzene	8.00E-04	2.24E-06	3.33E-14	4.17E-11	6.40E-05
Hexachlorobutadiene	3.00E-04	4.07E-06	6.06E-14	2.02E-10	3.10E-04
Hexachlorocyclopentadiene	2.00E-05	2.24E-06	3.33E-14	1.67E-09	0.0026
Hexachloroethane	1.00E-03	2.24E-06	3.33E-14	3.33E-11	5.12E-05
Indeno[1,2,3-cd]pyrene		2.24E-06	3.33E-14		
Isobutyl alcohol	3.00E-01	3.70E-09	5.51E-17	1.84E-16	2.82E-10
Isophorone	2.00E-01	2.24E-06	3.34E-14	1.67E-13	2.56E-07
Kepone		1.95E-05	2.91E-13		
Methyl Acetate	1.00E+00	9.54E-08	4.65E-13	4.65E-13	7.15E-07
Methylene Chloride	8.57E-01	1.65E-05	1.14E-10	1.33E-10	2.04E-04
Naphthalene	8.57E-04	8.38E-05	4.43E-10	5.17E-07	0.79
Nitrobenzene	5.71E-04	2.24E-06	8.17E-12	1.43E-08	0.022
N-Nitroso-di-n-propylamine		2.24E-06	3.33E-14		
N-Nitrosodiphenylamine		2.24E-06	3.33E-14		
Pentachloropheno	3.00E-02	1.10E-05	1.64E-13	5.46E-12	8.39E-06
Phenanthrene	3.00E-01	2.30E-04	3.42E-12	1.14E-11	1.75E-05
Phenol	6.00E-01	1.57E-05	2.34E-13	3.90E-13	5.99E-07
Pyrene	3.00E-02	4.99E-05	7.42E-13	2.47E-11	3.80E-05
Styrene	2.90E-01	2.02E-10	1.39E-15	4.81E-15	7.39E-09
Tetrachloroethene	1.14E-01	1.90E-06	1.31E-11	1.15E-10	1.77E-04
Toluene	1.10E-01	1.93E-04	1.34E-09	1.21E-08	0.019
Trichloroethene	6.00E-03	1.42E-05	9.80E-11	1.63E-08	0.025
Xylene (ortho)	2.00E-01	7.65E-07	5.28E-12	2.64E-11	4.06E-05
Xylene (total)	2.00E-01	6.80E-04	4.70E-09	2.35E-08	0.036
Aluminum	1.40E-03	1.39E+00	2.07E-08	1.48E-05	23
Antimony		1.15E-03	1.71E-11		
Arsenic		1.11E-03	1.66E-11		
Barium	1.43E-04	3.54E-02	5.26E-10	3.68E-06	5.7
Beryllium	5.71E-06	5.66E-05	8.42E-13	1.48E-07	0.23
Boron	5.71E-03	3.64E-02	5.41E-10	9.47E-08	0.15

Table D-16. Delivery driver scenario (100 m from ICDF Complex)—potential noncarcinogenic risk.

Constituent	RfD <sub>i</sub> (mg/kg-day)	EPC (mg/kg)	Inhalation		% Contribution
			CDI (mg/kg-day)	HQ	
Cadmium		7.06E-04	1.05E-11		
Chromium		8.11E-03	1.21E-10		
Cobalt		1.19E-03	1.77E-11		
Copper		5.89E-03	8.76E-11		
Cyanide	8.57E-04	6.63E-05	9.87E-13		
Dysprosium		1.17E-02	1.74E-10		
Fluoride		7.62E-04	1.13E-11		
Iron		2.02E+00	3.00E-08		
Manganese	1.40E-05	4.07E-02	6.06E-10		
Mercury		1.86E-03	2.77E-11		
Molybdenum		2.01E-03	2.98E-11		
Nickel		3.87E-03	5.76E-11		
Selenium		1.67E-04	2.48E-12		
Silver		1.94E-03	2.88E-11		
Strontium		3.59E-03	5.34E-11		
Thallium		7.29E-05	1.09E-12		
Vanadium		4.19E-03	6.23E-11		
Zinc		4.10E-02	6.10E-10		
<b>Total HI</b>				<b>6.51E-05</b>	<b>100</b>

Guide to Appendix D Table Abbreviations:

- ABSd = Dermal Absorption Factor
- ABSGi = Gastrointestinal Absorption Factor
- CDI = Chronic Daily Intake
- ELCR = Excess Lifetime Cancer Risk
- EPC = Exposure Point Concentration
- HI = hazard index
- HQ = hazard quotient
- IC = Inhalation Concentration
- NA = not available
- SF = slope factor
- SFd = Dermal Slope Factor
- Sfi = Inhalation Slope Factor
- SFO = Oral Slope Factor
- URF = Inhalation Unit Risk Factor
- WOE = Weight of Evidence
- Cancer WOE Classifications:
- Group A: Human carcinogen.
- Group B: Probably human carcinogen.

**Table D-16. Delivery driver scenario (100 nm from ICDF Complex)—potential noncarcinogenic risk.**

Constituent	RfD <sub>i</sub> (mg/kg-day)	EPC (mg/kg)	Inhalation			% Contribution
			CDI (mg/kg-day)	HQ	%	
RfC = Reference Concentration			B1 - indicates that limited human data are available.			
RfDd = Dermal Reference Dose			B2 - indicates sufficient evidence in animals and inadequate or no evidence in humans.			
RfDi = Inhalation Reference Dose			Group C: Possible human carcinogen.			
RfDo = Oral Reference Dose			Group D: Not classifiable.			

**Table D-17. Delivery driver scenario (63 m from decon building)—potential excess lifetime cancer risk.**

Constituent	WOE	Sf <sub>i</sub> (mg/kg-day) <sup>-1</sup>	EPC (mg/kg)	Inhalation		%
				CDI (mg/kg-day)	ELCR Contribution	
1,1,1-Trichloroethane	D	7.47E-06	1.10E-11			
1,1,2,2-Tetrachloroethane	C	2.03E-01	2.35E-08	3.48E-14	7E-15	0.00
1,1,2-Trichloroethane	C	5.60E-02	1.15E-07	1.70E-13	1E-14	0.00
1,1-Dichloroethane	C	1.75E-01	1.11E-06	1.65E-12		
1,1-Dichloroethene	C	7.04E-07	1.04E-12	2E-13		0.01
1,2,4-Trichlorobenzene	D	5.42E-06	6.41E-12			
1,2-Dichlorobenzene	D	5.42E-06	8.01E-12			
1,2-Dichloroethane	B2	9.10E-02	2.56E-09	3.79E-15	3E-16	0.00
1,2-Dichloroethene (total)			1.54E-07	2.28E-13		
1,3-Dichlorobenzene	D	5.42E-06	8.01E-12			
1,4-Dichlorobenzene	C	2.20E-02	2.14E-04	3.17E-10	7E-12	0.2
1,4-Dioxane	B2	1.10E-02	8.95E-09	2.85E-17	3E-19	0.00
2,4,5-Trichlorophenol			2.12E-05	6.77E-14		
2,4,6-Trichlorophenol	B2	1.09E-02	8.69E-06	2.77E-14	3E-16	0.00
2,4-Dichlorophenol			1.03E-05	3.28E-14		
2,4-Dimethylphenol			8.69E-06	2.77E-14		
2,4-Dinitrophenol	B2		2.42E-05	7.73E-14		
2,4-Dinitrotoluene	B2		5.42E-06	1.73E-14		
2,6-Dinitrotoluene	B2		9.84E-06	3.14E-14		
2-Butanone	D		1.18E-05	1.31E-11		
2-Chloronaphthalene			5.42E-06	3.35E-12		
2-Chlorophenol			8.69E-06	1.29E-11		
2-Hexanone			1.28E-06	4.09E-15		
2-Methylnaphthalene			2.44E-04	6.50E-11		
2-Methylphenol	C		9.82E-06	3.13E-14		
2-Nitroaniline			1.29E-05	1.92E-11		
2-Nitrophenol	B2	4.50E-01	8.69E-06	2.77E-14	8E-15	0.00
3,3'-Dichlorobenzidine			5.42E-06	1.73E-14		
3-Nitroaniline			1.29E-05	1.92E-11		
4,6-Dinitro-2-methylphenol			2.12E-05	6.77E-14		
4-Chloroaniline			1.94E-05	6.19E-14		
4-Methyl-2-Pentanone			1.41E-05	2.09E-11		
4-Methylphenol	C		1.84E-05	5.85E-14		
4-Nitroaniline	D		1.29E-05	1.92E-11		
4-Nitrophenol			2.45E-05	7.82E-14		
Acenaphthene			9.63E-05	2.69E-11		

**Table D-17. Delivery driver scenario (63 m from decon building)—potential excess lifetime cancer risk.**

Constituent	WOE	Sf <sub>i</sub>	EPC	Inhalation		% Contribution
				(mg/kg-day) <sup>-1</sup>	(mg/kg-day)	
Aceraphthylene	D		9.84E-06	3.70E-12		
Acetone	D		2.95E-04	4.37E-10		
Acetonitrile	C		8.95E-09	9.73E-15		
Acrolein	B1	2.38E-01	4.31E-09	6.38E-15		
Acrylonitrile	D		1.52E-04	1.15E-11		
Anthracene	B2	2.49E-02	5.45E-08	1.74E-16	4E-18	0.00
Aramidite	B2	7.00E-02	3.66E-06	1.17E-14	8E-16	0.00
Aroclor-1016	B2	2.00E+00	6.11E-05	1.95E-13	4E-13	0.0
Aroclor-1254	B2	2.00E+00	3.43E-04	1.09E-12	2E-12	0
Aroclor-1260	B2	2.00E+00	2.96E-05	9.43E-14	2E-13	0.0
Aroclor-1268	B2	2.70E-02	2.87E-04	4.25E-10	1E-11	0.4
Benzene	A					
Benzidine	A	2.30E+02	1.38E-07	4.41E-16	1E-13	0.0
Benzo(a)anthracene	B2	3.10E-01	1.20E-04	3.84E-13	1E-13	0.0
Benzo(a)pyrene	B2	3.10E+00	4.99E-05	1.59E-13	5E-13	0.0
Benzo(b)fluoranthene	B2	3.10E-01	8.54E-05	2.72E-13	8E-14	0.0
Benzo(g,h,i)perylene	D		5.42E-06	1.73E-14		
Benzo(k)fluoranthene	B2	3.10E-02	8.85E-06	2.82E-14	9E-16	0.00
Benzoic acid	D		4.07E-06	1.30E-14		
bis(2-Chloroethyl)ether	B2	1.16E+00	5.42E-06	3.40E-12	4E-12	0.1
bis(2-Chloroisopropyl)ether	C	3.50E-02	5.42E-06	8.01E-12	3E-13	0.01
bis(2-Ethylhexyl)phthalate	B2	1.40E-02	7.00E-05	2.23E-13	3E-15	0.00
Butylbenzylphthalate	C		3.23E-05	1.03E-13		
Carbazole	B2	2.00E-02	1.54E-05	4.91E-14	1E-15	0.00
Carbon Disulfide			2.17E-05	3.21E-11		
Chlorobenzene	D		3.13E-06	4.63E-12		
Chloroethane		2.90E-03	1.44E-09	2.12E-15	6E-18	0.00
Chloromethane	C	6.30E-03	1.68E-07	2.48E-13	2E-15	0.00
Chrysene	B2	3.10E-03	1.26E-04	4.02E-13	1E-15	0.00
Dibenz(a,h)anthracene	B2	3.10E+00	5.42E-06	1.73E-14	5E-14	0.0
Dibenzofuran	D		1.54E-04	1.24E-11		
Diethylphthalate	D		5.42E-06	1.73E-14		
Dimethylphthalate	D		5.42E-06	1.73E-14		
Di-n-butylphthalate	D		1.14E-05	3.62E-14		
Di-n-octylphthalate			1.25E-05	3.98E-14		
Ethylbenzene	D		3.72E-05	5.50E-11		

Table D-17. Delivery driver scenario (63 m from decon building)—potential excess lifetime cancer risk.

Constituent	WOE	SF <sub>i</sub> (mg/kg-day) <sup>-1</sup>	EPC (mg/kg)	Inhalation		% Contribution
				CDI (mg/kg-day)	ELCR (mg/kg-day)	
Famphur			2.77E-08	8.82E-17		
Fluoranthene	D	3.63E-04	1.16E-12			
Fluorene	D	8.74E-05	2.79E-13			
Hexachlorobenzene	B2	1.61E+00	5.42E-06	1.73E-14	3E-14	0.00
Hexachlorobutadiene	C	7.80E-02	9.84E-06	3.14E-14	2E-15	0.00
Hexachlorocyclopentadiene	D	5.42E-06	1.73E-14			
Hexachloroethane	C	1.40E-02	5.42E-06	1.73E-14	2E-16	0.00
Indeno[1,2,3-cd]pyrene	B2	3.10E-01	5.42E-06	1.73E-14	5E-15	0.00
Isobutyl alcohol			8.95E-09	2.85E-17		
Isophorone	C	9.50E-04	5.42E-06	1.73E-14	2E-17	0.00
Kepone			1.80E+01	4.72E-05	1.51E-13	0
Methyl Acetate				2.30E-07	2.41E-13	
Methylene Chloride	B2	1.65E-03	3.98E-05	5.89E-11	1E-13	0.00
Naphthalene	C	2.02E-04	2.29E-10			
Nitrobenzene	B2	5.42E-06	4.23E-12			
N-Nitroso-di-n-propylamine	B2	7.00E+00	5.42E-06	1.73E-14	1E-13	0.0
N-Nitrosodiphenylamine	B2	4.90E-03	5.42E-06	1.73E-14	8E-17	0.00
Pentachlorophenol	B2	1.20E-01	2.66E-05	8.48E-14	1E-14	0.00
Phenanthrene	D	5.56E-04	1.77E-12			
PhenoI	D	3.80E-05	1.21E-13			
Pyrene	D	1.21E-04	3.84E-13			
Styrene	C	4.88E-10	7.22E-16			
Tetrachloroethene	C-B2	2.03E-03	4.59E-06	6.79E-12	1E-14	0.00
Toluene	D	4.67E-04	6.91E-10			
Trichloroethene	B2	6.00E-03	3.43E-05	5.07E-11	3E-13	0.01
Xylene (ortho)			1.85E-06	2.73E-12		
Xylene (total)	D		1.64E-03	2.43E-09		
Aluminum			3.37E+00	1.07E-08		
Antimony	D	2.78E-03	8.85E-12			
Arsenic	A	1.51E+01	2.69E-03	8.58E-12	1E-10	5
Barium	D	8.54E-02	2.72E-10			
Beryllium	B1	8.40E+00	1.37E-04	4.36E-13	4E-12	0
Boron	D	8.78E-02	2.80E-10			
Cadmium	B1	1.71E-03	5.44E-12	3E-11	1	
Chromium	A	1.96E-02	6.25E-11	3E-09	93	
Cobalt		2.87E-03	9.16E-12			

**Table D-17. Delivery driver scenario (63 m from decon building)—potential excess lifetime cancer risk.**

Constituent	WOE D	Sfi	EPC (mg/kg-day) <sup>-1</sup>	Inhalation		% Contribution
				CDI (mg/kg-day)	ELCR (mg/kg-day)	
Copper	D		1.42E-02	4.54E-11		
Cyanide			1.60E-04	5.11E-13		
Dysprosium			2.82E-02	9.01E-11		
Fluoride			1.84E-03	5.87E-12		
Iron			4.88E+00	1.55E-08		
Manganese	D		9.84E-02	3.14E-10		
Mercury	D		4.50E-03	1.43E-11		
Molybdenum			4.84E-03	1.54E-11		
Nickel	D		9.36E-03	2.98E-11		
Selenium	D		4.03E-04	1.28E-12		
Silver	D		4.68E-03	1.49E-11		
Strontium			8.66E-03	2.76E-11		
Thallium	D		1.76E-04	5.62E-13		
Vanadium	D		1.01E-02	3.22E-11		
Zinc	D		9.90E-02	3.16E-10		
<b>Estimated Total Risk =</b>				<b>3E-09</b>	<b>100</b>	

Guide to Appendix D Table Abbreviations:

ABSd = Dermal Absorption Factor	SF = slope factor
ABSGi = Gastrointestinal Absorption Factor	SFd = Dermal Slope Factor
CDI = Chronic Daily Intake	Sfi = Inhalation Slope Factor
ELCR = Excess Lifetime Cancer Risk	SFO = Oral Slope Factor
EPC = Exposure Point Concentration	URF = Inhalation Unit Risk Factor
HI = hazard index	WOE = Weight of Evidence
HQ = hazard quotient	Cancer WOE Classifications:
IC = Inhalation Concentration	Group A: Human carcinogen.
NA = not available	Group B: Probably human carcinogen.
Rf <sub>C</sub> = Reference Concentration	B1 - indicates that limited human data are available.
RfD <sub>d</sub> = Dermal Reference Dose	B2 - indicates sufficient evidence in animals and inadequate or no evidence in humans.
RfD <sub>i</sub> = Inhalation Reference Dose	Group C: Possible human carcinogen.
RfD <sub>o</sub> = Oral Reference Dose	Group D: Not classifiable.

**Table D-18. Delivery driver scenario (63 m from decon building)—potential noncarcinogenic risk.**

Constituent	RfD <sub>i</sub> (mg/kg-day)	EPC (mg/kg)	Inhalation		Contribution %
			CDI (mg/kg-day)	HQ	
1,1,1-Trichloroethane	2.86E-01	7.47E-06	5.15E-11	1.80E-10	1.15E-04
1,1,2,2-Tetrachloroethane	6.00E-02	2.35E-08	1.63E-13	2.71E-12	1.72E-06
1,1,2-Trichloroethane	4.00E-03	1.15E-07	7.95E-13	1.99E-10	1.26E-04
1,1-Dichloroethane	1.43E-01	1.11E-06	7.69E-12	5.38E-11	3.42E-05
1,1-Dichloroethene	9.00E-03	7.04E-07	4.86E-12	5.40E-10	3.43E-04
1,2,4-Trichlorobenzene	5.70E-02	5.42E-06	2.99E-11	5.25E-10	3.34E-04
1,2-Dichlorobenzene	5.71E-02	5.42E-06	3.74E-11	6.54E-10	4.16E-04
1,2-Dichloroethane	1.40E-03	2.56E-09	1.77E-14	1.26E-11	8.03E-06
1,2-Dichloroethene (total)	1.00E-02	1.54E-07	1.07E-12	1.07E-10	6.77E-05
1,3-Dichlorobenzene	9.00E-04	5.42E-06	3.74E-11	4.15E-08	0.026
1,4-Dichlorobenzene	2.29E-01	2.14E-04	1.48E-09	6.46E-09	0.0041
1,4-Dioxane					
2,4,5-Trichlorophenol	1.00E-01	2.12E-05	3.16E-13	3.16E-12	2.01E-06
2,4,6-Trichlorophenol					
2,4-Dichlorophenol	3.00E-03	1.03E-05	1.53E-13	5.10E-11	3.24E-05
2,4-Dimethylphenol	2.00E-02	8.69E-06	1.29E-13	6.46E-12	4.11E-06
2,4-Dinitrophenol	2.00E-03	2.42E-05	3.61E-13	1.80E-10	1.15E-04
2,4-Dinitrotoluene	2.00E-03	5.42E-06	8.06E-14	4.03E-11	2.56E-05
2,6-Dinitrotoluene	1.00E-03	9.84E-06	1.46E-13	1.46E-10	9.31E-05
2-Butanone	2.86E-01	1.18E-05	6.10E-11	2.13E-10	1.36E-04
2-Chloronaphthalene	8.00E-02	5.42E-06	1.56E-11	1.95E-10	1.24E-04
2-Chlorophenol	5.00E-03	8.69E-06	6.00E-11	1.20E-08	0.0076
2-Hexanone	1.40E-03	1.28E-06	1.91E-14	1.36E-11	8.67E-06
2-Methylnaphthalene					
2-Methylphenol	5.00E-02	9.82E-06	1.46E-13	2.92E-12	1.86E-06
2-Nitroaniline	5.71E-05	1.29E-05	8.94E-11	1.56E-06	0.99
2-Nitrophenol	8.00E-03	8.69E-06	1.29E-13	1.62E-11	1.03E-05
3,3'-Dichlorobenzidine					
3-Nitroaniline	5.71E-05	1.29E-05	8.94E-11	1.56E-06	0.99
4,6-Dinitro-2-methylphenol	2.00E-03	2.12E-05	3.16E-13	1.58E-10	1.00E-04
4-Chloroaniline	4.00E-03	1.94E-05	2.89E-13	7.22E-11	4.59E-05
4-Methyl-2-Pentanone	2.29E-02	1.41E-05	9.74E-11	4.26E-09	0.0027
4-Methylphenol	5.00E-03	1.84E-05	2.73E-13	5.46E-11	3.47E-05
4-Nitroaniline	5.71E-05	1.29E-05	8.94E-11	1.56E-06	0.99
4-Nitrophenol	8.00E-03	2.45E-05	3.65E-13	4.56E-11	2.90E-05

**Table D-18. Delivery driver scenario (63 m from decon building)—potential noncarcinogenic risk.**

Constituent	RfD <sub>i</sub> (mg/kg-day)	Inhalation			Contribution %
		EPC (mg/kg)	CDI (mg/kg-day)	HQ	
Acenaphthene	6.00E-02	9.63E-05	1.25E-10	2.09E-09	0.0013
Acenaphthylene	6.00E-02	9.84E-06	1.72E-11	2.87E-10	1.83E-04
Acetone	1.00E-01	2.95E-04	2.04E-09	2.04E-08	0.013
Acetonitrile	1.70E-02	8.95E-09	4.54E-14	2.67E-12	1.70E-06
Acrolein	5.71E-06	4.31E-09	2.98E-14	5.21E-09	0.0033
Acrylonitrile	5.71E-04	4.31E-09	2.98E-14	5.21E-11	3.31E-05
Anthracene	3.00E-01	1.52E-04	5.38E-11	1.79E-10	1.14E-04
Aramite	5.00E-02	5.45E-08	8.11E-16	1.62E-14	1.03E-08
Aroclor-1016	7.00E-05	3.66E-06	5.44E-14	7.78E-10	4.94E-04
Aroclor-1254	2.00E-05	6.11E-05	9.09E-13	4.55E-08	0.029
Aroclor-1260		3.43E-04	5.10E-12		
Aroclor-1268		2.96E-05	4.40E-13		
Benzene	1.71E-03	2.87E-04	1.98E-09	1.16E-06	0.74
Benzidine	3.00E-03	1.38E-07	2.06E-15	6.86E-13	4.36E-07
Benzo(a)anthracene		1.20E-04	1.79E-12		
Benzo(a)pyrene		4.99E-05	7.43E-13		
Benzo(b)fluoranthene		8.54E-05	1.27E-12		
Benzo(g,h,i)perylene	3.00E-02	5.42E-06	8.06E-14	2.69E-12	1.71E-06
Benzo(k)fluoranthene		8.85E-06	1.32E-13		
Benzoic acid	4.00E+00	4.07E-06	6.06E-14	1.52E-14	9.63E-09
bis(2-Chloroethyl)ether		5.42E-06	1.59E-11		
bis(2-Chloroisopropyl)ether	4.00E-02	5.42E-06	3.74E-11	9.35E-10	5.94E-04
bis(2-Ethylhexyl)phthalate	2.20E-02	7.00E-05	1.04E-12	4.74E-11	3.01E-05
Butylbenzylphthalate	2.00E-01	3.23E-05	4.81E-13	2.40E-12	1.53E-06
Carbazole		1.54E-05	2.29E-13		
Carbon Disulfide	2.00E-01	2.17E-05	1.50E-10	7.48E-10	4.76E-04
Chlorobenzene	1.70E-02	3.13E-06	2.16E-11	1.27E-09	8.07E-04
Chloroethane	2.86E+00	1.44E-09	9.91E-15	3.47E-15	2.21E-09
Chloromethane	8.60E-02	1.68E-07	1.16E-12	1.35E-11	8.57E-06
Chrysene		1.26E-04	1.88E-12		
Dibenz(a,h)anthracene		5.42E-06	8.06E-14		
Dibenzofuran	4.00E-03	1.54E-04	5.78E-11	1.44E-08	0.0092
Diethylphthalate	8.00E-01	5.42E-06	8.06E-14	1.01E-13	6.41E-08
Dimethylphthalate	1.00E+01	5.42E-06	8.06E-14	8.06E-15	5.12E-09
Di-n-butylphthalate	1.00E-01	1.14E-05	1.69E-13	1.69E-12	1.07E-06

Table D-18. Delivery driver scenario (63 m from decon building)—potential noncarcinogenic risk.

Constituent	RfD <sub>i</sub> (mg/kg-day)	EPC (mg/kg)	Inhalation		% Contribution
			CDI (mg/kg-day)	HQ	
Di-n-octylphthalate	2.00E-02	1.25E-05	1.86E-13	9.28E-12	5.90E-06
Ethylbenzene	2.90E-01	3.72E-05	2.57E-10	8.85E-10	5.62E-04
Famphur		2.77E-08	4.12E-16		
Fluoranthene	4.00E-02	3.63E-04	5.40E-12	1.35E-10	8.58E-05
Fluorene	4.00E-02	8.74E-05	1.30E-12	3.25E-11	2.07E-05
Hexachlorobenzene	8.00E-04	5.42E-06	8.06E-14	1.01E-10	6.40E-05
Hexachlorobutadiene	3.00E-04	9.84E-06	1.46E-13	4.88E-10	3.10E-04
Hexachlorocyclopentadiene	2.00E-05	5.42E-06	8.06E-14	4.03E-09	0.0026
Hexachloroethane	1.00E-03	5.42E-06	8.06E-14	8.06E-11	5.12E-05
Indeno(1,2,3-cd)pyrene		5.42E-06	8.06E-14		
Isobutyl alcohol	3.00E-01	8.95E-09	1.33E-16	4.44E-16	2.82E-10
Isophorone	2.00E-01	5.42E-06	8.06E-14	4.03E-13	2.56E-07
Kepone		4.72E-05	7.03E-13		
Methyl Acetate	1.00E+00	2.30E-07	1.12E-12	1.12E-12	7.15E-07
Methylene Chloride	8.57E-01	3.98E-05	2.75E-10	3.21E-10	2.04E-04
Naphthalene	8.57E-04	2.02E-04	1.07E-09	1.25E-06	0.79
Nitrobenzene	5.71E-04	5.42E-06	1.97E-11	3.45E-08	0.022
N-Nitroso-di-n-propylamine		5.42E-06	8.06E-14		
N-Nitrosodiphenylamine		5.42E-06	8.06E-14		
Pentachlorophenol	3.00E-02	2.66E-05	3.96E-13	1.32E-11	8.39E-06
Phenanthrene	3.00E-01	5.56E-04	8.27E-12	2.76E-11	1.75E-05
Phenol	6.00E-01	3.80E-05	5.65E-13	9.42E-13	5.99E-07
Pyrene	3.00E-02	1.21E-04	1.79E-12	5.98E-11	3.80E-05
Styrene	2.90E-01	4.88E-10	3.37E-15	1.16E-14	7.39E-09
Tetrachloroethene	1.14E-01	4.59E-06	3.17E-11	2.78E-10	1.77E-04
Toluene	1.10E-01	4.67E-04	3.23E-09	2.93E-08	0.019
Trichloroethene	6.00E-03	3.43E-05	2.37E-10	3.95E-08	0.025
Xylene (ortho)	2.00E-01	1.85E-06	1.28E-11	6.38E-11	4.06E-05
Xylene (total)	2.00E-01	1.64E-03	1.14E-08	5.68E-08	0.036
Aluminum	1.40E-03	3.37E+00	5.01E-08	3.58E-05	23
Antimony		2.78E-03	4.13E-11		
Arsenic		2.69E-03	4.00E-11		
Barium	1.43E-04	8.54E-02	1.27E-09	8.90E-06	5.7
Beryllium	5.71E-06	1.37E-04	2.04E-12	3.56E-07	0.23
Boron	5.71E-03	8.78E-02	1.31E-09	2.29E-07	0.15

**Table D-18. Delivery driver scenario (63 m from decon building)—potential noncarcinogenic risk.**

Constituent	RfD <sub>i</sub> (mg/kg-day)	EPC (mg/kg)	Inhalation		% Contribution
			CDI (mg/kg-day)	HQ	
Cadmium	1.71E-03	2.54E-11			
Chromium	1.96E-02	2.91E-10			
Cobalt	2.87E-03	4.27E-11			
Copper	1.42E-02	2.12E-10			
Cyanide	1.60E-04	2.38E-12			
Dysprosium	2.82E-02	4.20E-10			
Fluoride	1.84E-03	2.74E-11			
Iron	4.88E+00	7.26E-08			
Manganese	1.40E-05	9.84E-02	1.46E-09	1.05E-04	66
Mercury	4.50E-03	6.69E-11			
Molybdenum	4.84E-03	7.21E-11			
Nickel	9.36E-03	1.39E-10			
Selenium	4.03E-04	5.99E-12			
Silver	4.68E-03	6.97E-11			
Strontium	8.66E-03	1.29E-10			
Thallium	1.76E-04	2.62E-12			
Vanadium	1.01E-02	1.50E-10			
Zinc	9.90E-02	1.47E-09			
<b>Total HI</b>				<b>1.57E-04</b>	<b>100</b>

Guide to Appendix D Table Abbreviations:

- ABSD = Dermal Absorption Factor
- ABSgi = Gastrointestinal Absorption Factor
- CDI = Chronic Daily Intake
- ELCR = Excess Lifetime Cancer Risk
- EPC = Exposure Point Concentration
- HI = hazard index
- HQ = hazard quotient
- IC = Inhalation Concentration
- NA = not available
- SF = slope factor
- SFD = Dermal Slope Factor
- SFI = Inhalation Slope Factor
- SFO = Oral Slope Factor
- URF = Inhalation Unit Risk Factor
- WOE = Weight of Evidence
- Cancer WOE Classifications:
- Group A: Human carcinogen.
- Group B: Probably human carcinogen.

**Table D-18. Delivery driver scenario (63 m from decon building)—potential noncarcinogenic risk.**

Constituent	RfD <sub>i</sub> (mg/kg-day)	Inhalation			Contribution %
		EPC (mg/kg)	CDI (mg/kg-day)	HQ	
Rf <sub>C</sub> = Reference Concentration		B1 - indicates that limited human data are available.			
RfD <sub>d</sub> = Dermal Reference Dose		B2 - indicates sufficient evidence in animals and inadequate or no evidence in humans.			
RfD <sub>i</sub> = Inhalation Reference Dose		Group C: Possible human carcinogen.			
RfD <sub>o</sub> = Oral Reference Dose		Group D: Not classifiable.			

**Table D-19. ICDF office worker scenario (100 m from ICDF landfill)—potential excess lifetime cancer risk.**

Constituent	WOE	Sf <sub>i</sub> (mg/kg-day) <sup>-1</sup>	EPC (mg/kg)	Inhalation		%
				CDI (mg/kg-day)	ELCR Contribution	
1,1,1-Trichloroethane	D		3.09E-06	3.91E-14		
1,1,2,2-Tetrachloroethane	C	2.03E-01	9.74E-09	1.23E-16	3E-17	0.00
1,1,2-Trichloroethane	C	5.60E-02	4.77E-08	6.04E-16	3E-17	0.00
1,1-Dichloroethane	C		4.61E-07	5.84E-15		
1,1-Dichloroethene	C	1.75E-01	2.91E-07	3.69E-15	6E-16	0.00
1,2,4-Trichlorobenzene	D		2.24E-06	2.84E-14		
1,2-Dichlorobenzene	D		2.24E-06	2.84E-14		
1,2-Dichloroethane	B2	9.10E-02	1.06E-09	1.34E-17		
1,2-Dichloroethene (total)			6.39E-08	8.09E-16		
1,3-Dichlorobenzene	D		2.24E-06	2.84E-14		
1,4-Dichlorobenzene	C	2.20E-02	8.87E-05	1.12E-12	2E-14	0.0
1,4-Dioxane	B2	1.10E-02	3.70E-09	1.49E-17	2E-19	0.00
2,4,5-Trichlorophenol			8.79E-06	3.54E-14		
2,4,6-Trichlorophenol	B2	1.09E-02	3.60E-06	1.45E-14	2E-16	0.00
2,4-Dichlorophenol			4.25E-06	1.71E-14		
2,4-Dimethylphenol			3.60E-06	1.45E-14		
2,4-Dinitrophenol			1.00E-05	4.04E-14		
2,4-Dinitrotoluene	B2		2.24E-06	9.02E-15		
2,6-Dinitrotoluene	B2		4.07E-06	1.64E-14		
2-Butanone	D		4.87E-06	6.17E-14		
2-Chloronaphthalene			2.24E-06	2.84E-14		
2-Chlorophenol			3.60E-06	4.55E-14		
2-Hexanone			5.31E-07	2.14E-15		
2-Methylnaphthalene			1.01E-04	1.28E-12		
2-Methylphenol	C		4.07E-06	1.64E-14		
2-Nitroaniline			5.36E-06	6.79E-14		
2-Nitrophenol			3.60E-06	1.45E-14		
3,3'-Dichlorobenzidine	B2	4.50E-01	2.24E-06	9.02E-15	4E-15	0.00
3-Nitroaniline			5.36E-06	6.79E-14		
4,6-Dinitro-2-methylphenol			8.79E-06	3.54E-14		
4-Chloroaniline			8.04E-06	3.24E-14		
4-Methyl-2-Pantanone			5.84E-06	7.39E-14		
4-Methylphenol	C		7.60E-06	3.06E-14		
4-Nitroaniline	D		5.36E-06	6.79E-14		
4-Nitrophenol			1.02E-05	4.09E-14		
Acenaphthene			3.98E-05	5.05E-13		

Table D-19. ICDF office worker scenario (100 m from ICDF landfill)—potential excess lifetime cancer risk.

Constituent		WOE (mg/kg-day) <sup>-1</sup>	Sfi (mg/kg-day) <sup>-1</sup>	EPC (mg/kg)	Inhalation		ELCR Contribution	%
					CDI	ELCR		
Acenaphthylene	D	4.07E-06	5.16E-14					
Acetone	D	1.22E-04	1.55E-12					
Acetonitrile	C	3.70E-09	4.69E-17					
Acrolein	B1	1.78E-09	2.26E-17					
Acrylonitrile	D	6.31E-05	7.99E-13					
Anthracene	D	2.26E-08	9.08E-17					
Aramite	B2	2.49E-02	2E-18					
Aroclor-1016	B2	7.00E-02	1.51E-06					
Aroclor-1234	B2	2.00E+00	2.53E-05					
Aroclor-1260	B2	2.00E+00	1.42E-04					
Aroclor-1268	B2	2.00E+00	1.22E-05					
Benzene	A	2.70E-02	1.19E-04					
Benzidine	A	2.30E+02	5.72E-08					
Benzo(a)anthracene	B2	3.10E-01	4.98E-05					
Benzo(a)pyrene	B2	3.10E+00	2.07E-05					
Benzo(b)fluoranthene	B2	3.10E-01	3.54E-05					
Benzo(g,h,i)perylene	D	2.24E-06	9.02E-15					
Benzo(k)fluoranthene	B2	3.10E-02	3.66E-06					
Benzoic acid	D	1.69E-06	6.79E-15					
bis(2-Chloroethyl)ether	B2	1.16E+00	2.24E-06					
bis(2-Chloroisopropyl)ether	C	3.50E-02	2.24E-06					
bis(2-Ethylhexyl)phthalate	B2	1.40E-02	2.90E-05					
Butylbenzylphthalate	C	1.34E-05	5.39E-14					
Carbazole	B2	2.00E-02	6.37E-06					
Carbon Disulfide		8.97E-06	1.14E-13					
Chlorobenzene	D	1.29E-06	1.64E-14					
Chloorethane		2.90E-03	5.94E-10					
Chloromethane	C	6.30E-03	6.95E-08					
Chrysene	B2	3.10E-03	5.22E-05					
Dibenza(h)anthracene	B2	3.10E+00	2.24E-06					
Dibenzofuran	D	6.39E-05	8.09E-13					
Diethylphthalate	D	2.24E-06	9.03E-15					
Dimethylphthalate	D	2.24E-06	9.02E-15					
Di-n-butylphthalate	D	4.70E-06	1.89E-14					
Di-n-octylphthalate		5.17E-06	2.08E-14					
Ethylbenzene	D	1.54E-05	1.95E-13					

Table D-19. ICDF office worker scenario (100 m from ICDF landfill)—potential excess lifetime cancer risk.

Constituent	WOE	Sf <sup>1</sup>	EPC	Inhalation		ELCR	Contribution %
				CDI	(mg/kg-day)		
Famphur			1.14E-08	4.61E-17			
Fluoranthene	D	D	1.50E-04	6.05E-13			
Fluorene	B2	1.61E+00	3.62E-05	1.46E-13			
Hexachlorobenzene	C	7.80E-02	2.24E-06	9.02E-15	1E-14	0.00	
Hexachlorobutadiene	D		4.07E-06	1.64E-14	1E-15	0.00	
Hexachlorocyclopentadiene	D		2.24E-06	9.02E-15			
Hexachloroethane	C	1.40E-02	2.24E-06	9.02E-15	1E-16	0.00	
Indeno[1,2,3-cd]pyrene	B2	3.10E-01	2.24E-06	9.02E-15	3E-15	0.00	
Isobutyl alcohol			3.70E-09	1.49E-17			
Isophorone	C	9.50E-04	2.24E-06	9.03E-15	9E-18	0.00	
Kepone		1.80E+01	1.95E-05	7.87E-14	1E-12	0	
Methyl Acetate			9.54E-08	1.21E-15			
Methylene Chloride	B2	1.65E-03	1.65E-05	2.09E-13	3E-16	0.00	
Naphthalene	C		8.38E-05	1.06E-12			
Nitrobenzene	B2		2.24E-06	2.84E-14			
N-Nitroso-di-n-propylamine	B2	7.00E+00	2.24E-06	9.02E-15	6E-14	0.0	
N-Nitrosodiphenylamine	B2	4.90E-03	2.24E-06	9.02E-15	4E-17	0.00	
Pentachlorophenol	B2	1.20E-01	1.10E-05	4.43E-14	5E-15	0.00	
Phenanthrene	D		2.30E-04	9.26E-13			
Phenol	D		1.57E-05	6.33E-14			
Pyrene	D		4.99E-05	2.01E-13			
Styrene	C		2.02E-10	2.56E-18			
Tetrachloroethene	C-B2	2.03E-03	1.90E-06	2.40E-14	5E-17	0.00	
Toluene	D		1.93E-04	2.45E-12			
Trichloroethene	B2	6.00E-03	1.42E-05	1.80E-13	1E-15	0.00	
Xylene (ortho)	D		7.65E-07	9.69E-15			
Xylene (total)	D		6.80E-04	8.62E-12			
Aluminum	D		1.39E+00	5.61E-09			
Antimony	D		1.15E-03	4.62E-12			
Arsenic	A	1.51E+01	1.11E-03	4.48E-12	7E-11	5	
Barium	D		3.54E-02	1.42E-10			
Beryllium	B1	8.40E+00	5.66E-05	2.28E-13	2E-12	0	
Boron	D		3.64E-02	1.46E-10			
Cadmium	B1	6.30E+00	7.06E-04	2.84E-12	2E-11	1	
Chromium	A	4.20E+01	8.11E-03	3.26E-11	1E-09	94	
Cobalt			1.19E-03	4.79E-12			

Table D-19. ICDF office worker scenario (100 m from ICDF landfill)—potential excess lifetime cancer risk.

Constituent		S <sub>fi</sub>	EPC	Inhalation		%
				(mg/kg-day) <sup>-1</sup>	(mg/kg)	
Copper	D	5.89E-03	2.37E-11			
Cyanide		6.63E-05	2.67E-13			
Dysprosium		1.17E-02	4.71E-11			
Fluoride		7.62E-04	3.07E-12			
Iron		2.02E-00	8.12E-09			
Manganese	D	4.07E-02	1.64E-10			
Mercury	D	1.86E-03	7.49E-12			
Molybdenum		2.01E-03	8.07E-12			
Nickel	D	3.87E-03	1.56E-11			
Selenium	D	1.67E-04	6.71E-13			
Silver	D	1.94E-03	7.80E-12			
Strontium		3.59E-03	1.44E-11			
Thallium	D	7.29E-05	2.94E-13			
Vanadium		4.19E-03	1.69E-11			
Zinc	D	4.10E-02	1.65E-10			
<b>Estimated Total Risk =</b>				1E-09	100	

Guide to Appendix D Table Abbreviations:

ABSd = Dermal Absorption Factor	SF = slope factor
ABSGi = Gastrointestinal Absorption Factor	SFd = Dermal Slope Factor
CDI = Chronic Daily Intake	Sfi = Inhalation Slope Factor
ELCR = Excess Lifetime Cancer Risk	SFo = Oral Slope Factor
EPC = Exposure Point Concentration	URF = Inhalation Unit Risk Factor
HI = hazard index	WOE = Weight of Evidence
HQ = hazard quotient	Cancer WOE Classifications:
IC = Inhalation Concentration	Group A: Human carcinogen.
NA = not available	Group B: Probably human carcinogen.
Rf <sub>C</sub> = Reference Concentration	B1 - indicates that limited human data are available.
RfD <sub>d</sub> = Dermal Reference Dose	B2 - indicates sufficient evidence in animals and inadequate or no evidence in humans.
RfD <sub>i</sub> = Inhalation Reference Dose	Group C: Possible human carcinogen.
RfD <sub>o</sub> = Oral Reference Dose	Group D: Not classifiable.

Table D-20. ICDF office worker scenario (100 m from ICDF landfill)—potential noncarcinogenic risk.

Constituent	RfD <sub>i</sub> (mg/kg-day)	EPC (mg/kg)	Inhalation		Contribution %
			CDI (mg/kg-day)	HO	
1,1,1-Trichloroethane	2.86E-01	3.09E-06	1.83E-13	6.39E-13	8.15E-07
1,1,2,2-Tetrachloroethane	6.00E-02	9.74E-09	5.76E-16	9.60E-15	1.22E-08
1,1,2-Trichloroethane	4.00E-03	4.77E-08	2.82E-15	7.05E-13	8.99E-07
1,1-Dichloroethane	1.43E-01	4.61E-07	2.72E-14	1.91E-13	2.43E-07
1,1-Dichloroethene	9.00E-03	2.91E-07	1.72E-14	1.91E-12	2.44E-06
1,2,4-Trichlorobenzene	5.70E-02	2.24E-06	1.32E-13	2.32E-12	2.96E-06
1,2-Dichlorobenzene	5.71E-02	2.24E-06	1.32E-13	2.32E-12	2.96E-06
1,2-Dichloroethane	1.40E-03	1.06E-09	6.26E-17	4.47E-14	5.71E-08
1,2-Dichloroethene (total)	1.00E-02	6.39E-08	3.77E-15	3.77E-13	4.82E-07
1,3-Dichlorobenzene	9.00E-04	2.24E-06	1.32E-13	1.47E-10	1.88E-04
1,4-Dichlorobenzene	2.29E-01	8.87E-05	5.24E-12	2.29E-11	2.92E-05
1,4-Dioxane					
2,4,5-Trichlorophenol	1.00E-01	8.79E-06	1.65E-13	1.65E-12	2.11E-06
2,4,6-Trichlorophenol					
2,4-Dichlorophenol	3.00E-03	4.25E-06	7.99E-14	2.66E-11	3.40E-05
2,4-Dimethylphenol	2.00E-02	3.60E-06	6.76E-14	3.38E-12	4.31E-06
2,4-Dinitrophenol	2.00E-03	1.00E-05	1.88E-13	9.42E-11	1.20E-04
2,4-Dinitrotoluene	2.00E-03	2.24E-06	4.21E-14	2.11E-11	2.69E-05
2,6-Dinitrotoluene	1.00E-03	4.07E-06	7.65E-14	7.65E-11	9.77E-05
2-Butanone	2.86E-01	4.87E-06	2.88E-13	1.01E-12	1.29E-06
2-Chloronaphthalene	8.00E-02	2.24E-06	1.32E-13	1.66E-12	2.11E-06
2-Chlorophenol	5.00E-03	3.60E-06	2.13E-13	4.25E-11	5.42E-05
2-Hexanone	1.40E-03	5.31E-07	9.98E-15	7.13E-12	9.10E-06
2-Methylhaphthalene					
2-Methylphenol	5.00E-02	4.07E-06	7.64E-14	1.53E-12	1.95E-06
2-Nitroaniline	5.71E-05	5.36E-06	3.17E-13	5.54E-09	0.0071
2-Nitrophenol	8.00E-03	3.60E-06	6.76E-14	8.44E-12	1.08E-05
3,3'-Dichlorobenzidine					
3-Nitroaniline	5.71E-05	5.36E-06	3.17E-13	5.54E-09	0.0071
4,6-Dinitro-2-methylphenol	2.00E-03	8.79E-06	1.65E-13	8.25E-11	1.05E-04
4-Chloroaniline	4.00E-03	8.04E-06	1.51E-13	3.77E-11	4.82E-05
4-Methyl-2-Pentanone	2.29E-02	5.84E-06	3.45E-13	1.51E-11	1.93E-05
4-Methylphenol	5.00E-03	7.60E-06	1.43E-13	2.86E-11	3.64E-05
4-Nitroaniline	5.71E-05	5.36E-06	3.17E-13	5.54E-09	0.0071
4-Nitrophenol	8.00E-03	1.02E-05	1.91E-13	2.38E-11	3.04E-05

**Table D-20. ICDF office worker scenario (100 m from ICDF landfill)—potential noncarcinogenic risk.**

Constituent	RF <sub>D</sub> (mg/kg-day)	EPC (mg/kg)	Inhalation		Contribution %
			CDI (mg/kg-day)	HQ	
Acenaphthene	6.00E-02	3.98E-05	2.35E-12	3.92E-11	5.01E-05
Acenaphthylene	6.00E-02	4.07E-06	2.41E-13	4.01E-12	5.12E-06
Acetone	1.00E-01	1.22E-04	7.22E-12	7.22E-11	9.22E-05
Acetonitrile	1.70E-02	3.70E-09	2.19E-16	1.29E-14	1.64E-08
Acrolein	5.71E-06	1.78E-09	1.05E-16	1.85E-11	2.35E-05
Acrylonitrile	5.71E-04	1.78E-09	1.05E-16	1.85E-13	2.35E-07
Anthracene	3.00E-01	6.31E-05	3.73E-12	1.24E-11	1.59E-05
Aramite	5.00E-02	2.26E-08	4.24E-16	8.48E-15	1.08E-08
Aroclor-1016	7.00E-05	1.51E-06	2.84E-14	4.06E-10	5.18E-04
Aroclor-1254	2.00E-05	2.53E-05	4.75E-13	2.38E-08	0.030
Aroclor-1260		1.42E-04	2.67E-12		
Aroclor-1268		1.22E-05	2.30E-13		
Benzene	1.71E-03	1.19E-04	7.02E-12	4.11E-09	0.0052
Benzidine	3.00E-03	5.72E-08	1.08E-15	3.58E-13	4.57E-07
Benzo(a)anthracene		4.98E-05	9.36E-13		
Benzo(a)pyrene		2.07E-05	3.88E-13		
Benzo(b)fluoranthene		3.54E-05	6.64E-13		
Benzo(g,h,i)perylene	3.00E-02	2.24E-06	4.21E-14	1.40E-12	1.79E-06
Benzo(k)fluoranthene		3.66E-06	6.88E-14		
Benzoic acid	4.00E+00	1.69E-06	3.17E-14	7.92E-15	1.01E-08
bis(2-Chloroethyl)ether		2.24E-06	1.32E-13		
bis(2-Chloroisopropyl)ether	4.00E-02	2.24E-06	1.32E-13	3.31E-12	4.23E-06
bis(2-Ethylhexyl)phthalate	2.20E-02	2.90E-05	5.45E-13	2.48E-11	3.16E-05
Butylbenzylphthalate	2.00E-01	1.34E-05	2.51E-13	1.26E-12	1.60E-06
Carbazole		6.37E-06	1.20E-13		
Carbon Disulfide	2.00E-01	8.97E-06	5.30E-13	2.65E-12	3.38E-06
Chlorobenzene	1.70E-02	1.29E-06	7.65E-14	4.50E-12	5.74E-06
Chloroethane	2.86E+00	5.94E-10	3.51E-17	1.23E-17	1.57E-11
Chloromethane	8.60E-02	6.95E-08	4.11E-15	4.78E-14	6.09E-08
Chrysene		5.22E-05	9.81E-13		
Dibenz(a,h)anthracene		2.24E-06	4.21E-14		
Dibenzofuran	4.00E-03	6.39E-05	3.77E-12	9.44E-10	0.0012
Diethylphthalate	8.00E-01	2.24E-06	4.21E-14	5.27E-14	6.72E-08
Dimethylphthalate	1.00E+01	2.24E-06	4.21E-14	4.21E-15	5.37E-09
Di-n-butylphthalate	1.00E-01	4.70E-06	8.83E-14	8.83E-13	1.13E-06

Table D-20. ICDF office worker scenario (100 m from ICDF landfill)—potential noncarcinogenic risk.

Constituent	RfD <sub>i</sub> (mg/kg-day)	EPC (mg/kg)	Inhalation		% Contribution
			CDI (mg/kg-day)	HQ	
Di-n-octylphthalate	2.00E-02	5.17E-06	9.70E-14	4.85E-12	6.9E-06
Ethylbenzene	2.90E-01	1.54E-05	9.09E-13	3.13E-12	4.00E-06
Famphur		1.14E-08	2.15E-16		
Fluoranthene	4.00E-02	1.50E-04	2.82E-12	7.05E-11	9.00E-05
Fluorene	4.00E-02	3.62E-05	6.79E-13	1.70E-11	2.17E-05
Hexachlorobenzene	8.00E-04	2.24E-06	4.21E-14	5.26E-11	6.72E-05
Hexachlorobutadiene	3.00E-04	4.07E-06	7.65E-14	2.55E-10	3.26E-04
Hexachlorocyclopentadiene	2.00E-05	2.24E-06	4.21E-14	2.11E-09	0.0027
Hexachloroethane	1.00E-03	2.24E-06	4.21E-14	4.21E-11	5.37E-05
Indeno(1,2,3-cd)pyrene		2.24E-06	4.21E-14		
Isobutyl alcohol	3.00E-01	3.70E-09	6.96E-17	2.32E-16	2.96E-10
Isophorone	2.00E-01	2.24E-06	4.21E-14	2.11E-13	2.69E-07
Kepone		1.95E-05	3.67E-13		
Methyl Acetate	1.00E+00	9.54E-08	5.64E-15	5.64E-15	7.19E-09
Methylene Chloride	8.57E-01	1.65E-05	9.74E-13	1.14E-12	1.45E-06
Naphthalene	8.57E-04	8.38E-05	4.95E-12	5.78E-09	0.0074
Nitrobenzene	5.71E-04	2.24E-06	1.32E-13	2.32E-10	2.96E-04
N-Nitroso-di-n-propylamine		2.24E-06	4.21E-14		
N-Nitrosodiphenylamine		2.24E-06	4.21E-14		
Pentachlorophenol	3.00E-02	1.10E-05	2.07E-13	6.90E-12	8.80E-06
Phenanthrene	3.00E-01	2.30E-04	4.32E-12	1.44E-11	1.84E-05
Phenol	6.00E-01	1.57E-05	2.95E-13	4.92E-13	6.28E-07
Pyrene	3.00E-02	4.99E-05	9.37E-13	3.12E-11	3.99E-05
Styrene	2.90E-01	2.02E-10	1.19E-17	4.12E-17	5.25E-11
Tetrachloroethene	1.14E-01	1.90E-06	1.12E-13	9.84E-13	1.26E-06
Toluene	1.10E-01	1.93E-04	1.14E-11	1.04E-10	1.33E-04
Trichloroethene	6.00E-03	1.42E-05	8.39E-13	1.40E-10	1.78E-04
Xylene (ortho)	2.00E-01	7.65E-07	4.52E-14	2.26E-13	2.88E-07
Xylene (total)	2.00E-01	6.80E-04	4.02E-11	2.01E-10	2.57E-04
Aluminum	1.40E-03	1.39E+00	2.62E-08	1.87E-05	24
Antimony		1.15E-03	2.16E-11		
Arsenic		1.11E-03	2.09E-11		
Barium	1.43E-04	3.54E-02	6.64E-10	4.65E-06	5.9
Beryllium	5.71E-06	5.66E-05	1.06E-12	1.86E-07	0.24
Boron	5.71E-03	3.64E-02	6.83E-10	1.20E-07	0.15

**Table D-20. ICDF office worker scenario (100 m from ICDF landfill)—potential noncarcinogenic risk.**

Constituent	RfD <sub>i</sub> (mg/kg-day)	EPC (mg/kg)	Inhalation		Contribution %
			CDI (mg/kg-day)	HQ	
Cadmium	7.06E-04	1.33E-11			
Chromium	8.11E-03	1.52E-10			
Cobalt	1.19E-03	2.23E-11			
Copper	5.89E-03	1.11E-10			
Cyanide	6.63E-05	1.25E-12	1.45E-09	0.0019	
Dysprosium	1.17E-02	2.20E-10			
Fluoride	7.62E-04	1.43E-11			
Iron	2.02E+00	3.79E-08			
Manganese	1.40E-05	4.07E-02	7.65E-10	5.47E-05	70
Mercury	1.86E-03	3.50E-11			
Molybdenum	2.01E-03	3.77E-11			
Nickel	3.87E-03	7.27E-11			
Selenium	1.67E-04	3.13E-12			
Silver	1.94E-03	3.64E-11			
Strontium	3.59E-03	6.74E-11			
Thallium	7.29E-05	1.37E-12			
Vanadium	4.19E-03	7.86E-11			
Zinc	4.10E-02	7.70E-10			
<b>Total HI</b>			<b>7.84E-05</b>	<b>100</b>	

Guide to Appendix D Table Abbreviations:

- ABSD = Dermal Absorption Factor
- ABSgi = Gastrointestinal Absorption Factor
- CDI = Chronic Daily Intake
- ELCR = Excess Lifetime Cancer Risk
- EPC = Exposure Point Concentration
- HI = hazard index
- HQ = hazard quotient
- IC = Inhalation Concentration
- NA = not available
- SF = slope factor
- SFD = Dermal Slope Factor
- Sfi = Inhalation Slope Factor
- SFO = Oral Slope Factor
- URF = Inhalation Unit Risk Factor
- WOE = Weight of Evidence
- Cancer WOE Classifications:
- Group A: Human carcinogen.
- Group B: Probably human carcinogen.

Table D-20. ICDF office worker scenario (100 m from ICDF landfill)—potential noncarcinogenic risk.

Constituent	RfD <sub>i</sub> (mg/kg-day)	EPC (mg/kg)	Inhalation			%
			CDI (mg/kg-day)	HQ	Contribution	
Rf <sub>C</sub> = Reference Concentration		B1 - indicates that limited human data are available.				
RfD <sub>d</sub> = Dermal Reference Dose		B2 - indicates sufficient evidence in animals and inadequate or no evidence in humans.				
RfD <sub>i</sub> = Inhalation Reference Dose		Group C: Possible human carcinogen.				
RfD <sub>o</sub> = Oral Reference Dose		Group D: Not classifiable.				

Table D-21. ICDF office worker scenario (63 m from treatment area)—potential excess lifetime cancer risk.

Constituent		WOE	Sf <sub>i</sub> (mg/kg-day) <sup>-1</sup>	EPC (mg/kg)	Inhalation		%
					CDI (mg/kg-day)	ELCR	
1,1,1-Trichloroethane	D		7.47E-06	9.45E-14			
1,1,2,2-Tetrachloroethane	C	2.03E-01	2.35E-08	2.98E-16	6E-17	0.00	
1,1,2-Trichloroethane	C	5.60E-02	1.15E-07	1.46E-15	8E-17	0.00	
1,1-Dichloroethane	C		1.11E-06	1.41E-14			
1,1-Dichloroethene	C	1.75E-01	7.04E-07	8.92E-15	2E-15	0.00	
1,2,4-Trichlorobenzene	D		5.42E-06	6.86E-14			
1,2-Dichlorobenzene	D		5.42E-06	6.86E-14			
1,2-Dichloroethane	B2	9.10E-02	2.56E-09	3.24E-17	3E-18	0.00	
1,2-Dichloroethene (total)			1.54E-07	1.95E-15			
1,3-Dichlorobenzene	D		5.42E-06	6.86E-14			
1,4-Dichlorobenzene	C	2.20E-02	2.14E-04	2.71E-12	6E-14	0.0	
1,4-Dioxane	B2	1.10E-02	8.95E-09	3.60E-17	4E-19	0.00	
2,4,5-Trichlorophenol			2.12E-05	8.55E-14			
2,4,6-Trichlorophenol	B2	1.09E-02	8.69E-06	3.50E-14	4E-16	0.00	
2,4-Dichlorophenol			1.03E-05	4.14E-14			
2,4-Dimethylphenol			8.69E-06	3.50E-14			
2,4-Dinitrophenol			2.42E-05	9.76E-14			
2,4-Dinitrotoluene	B2		5.42E-06	2.18E-14			
2,6-Dinitrotoluene	B2		9.84E-06	3.96E-14			
2-Butanone	D		1.18E-05	1.49E-13			
2-Chloronaphthalene			5.42E-06	6.86E-14			
2-Chlorophenol			8.69E-06	1.10E-13			
2-Hexanone			1.28E-06	5.17E-15			
2-Methylnaphthalene			2.44E-04	3.09E-12			
2-Methylphenol	C		9.82E-06	3.95E-14			
2-Nitroaniline			1.29E-05	1.64E-13			
2-Nitrophenol			8.69E-06	3.50E-14			
3,3'-Dichlorobenzidine	B2	4.50E-01	5.42E-06	2.18E-14	1E-14	0.00	
3-Nitroaniline			1.29E-05	1.64E-13			
4,6-Dinitro-2-methylphenol			2.12E-05	8.55E-14			
4-Chloroaniline			1.94E-05	7.82E-14			
4-Methyl-2-Pentanone			1.41E-05	1.79E-13			
4-Methylphenol	C		1.84E-05	7.39E-14			
4-Nitroaniline			1.29E-05	1.64E-13			
4-Nitrophenol	D		2.45E-05	9.88E-14			
Acenaphthene			9.63E-05	1.22E-12			

Table D-21. ICDF office worker scenario (63 m from treatment area)—potential excess lifetime cancer risk.

Constituent		WOE	Sf <sub>i</sub> (mg/kg-day) <sup>-1</sup>	EPC (mg/kg)	Inhalation		%
					CDI (mg/kg-day)	ELCR Contribution	
Acenaphthylene	D	9.84E-06	1.25E-13				
Acetone	D	2.95E-04	3.74E-12				
Acetonitrile	C	8.95E-09	1.13E-16				
Acrolein	B1	4.31E-09	5.46E-17				
Acrylonitrile	D	4.31E-09	5.46E-17	1E-17	0.00		
Anthracene	D	1.52E-04	1.93E-12				
Aramidite	B2	2.49E-02	5.45E-08	2.19E-16	5E-18	0.00	
Aroclor-1016	B2	7.00E-02	3.66E-06	1.47E-14	1E-15	0.00	
Aroclor-1234	B2	2.00E+00	6.11E-05	2.46E-13	5E-13	0.0	
Aroclor-1260	B2	2.00E+00	3.43E-04	1.38E-12	3E-12	0	
Aroclor-1268	B2	2.00E+00	2.96E-05	1.19E-13	2E-13	0.0	
Benzene	A	2.70E-02	2.87E-04	3.64E-12	1E-13	0.0	
Benzidine	A	2.30E+02	1.38E-07	5.57E-16	1E-13	0.0	
Benzo(a)anthracene	B2	3.10E-01	1.20E-04	4.85E-13	2E-13	0.0	
Benzo(a)pyrene	B2	3.10E+00	4.99E-05	2.01E-13	6E-13	0.0	
Benzo(b)fluoranthene	B2	3.10E-01	8.54E-05	3.44E-13	1E-13	0.0	
Benzo(g,h,i)perylene	D	5.42E-06	2.18E-14				
Benzo(k)fluoranthene	B2	3.10E-02	8.85E-06	3.56E-14	1E-15	0.00	
Benzoic acid	D	4.07E-06	1.64E-14				
bis(2-Chloroethyl)ether	B2	1.16E+00	5.42E-06	6.86E-14	8E-14	0.0	
bis(2-Chloroisopropyl)ether	C	3.50E-02	5.42E-06	6.86E-14	2E-15	0.00	
bis(2-Ethylhexyl)phthalate	B2	1.40E-02	7.00E-05	2.82E-13	4E-15	0.00	
Butylbenzylphthalate	C	3.23E-05	1.30E-13				
Carbazole	B2	2.00E-02	1.54E-05	6.20E-14	1E-15	0.00	
Carbon Disulfide		2.17E-05	2.74E-13				
Chlorobenzene	D	3.13E-06	3.96E-14				
Chloroethane	C	2.90E-03	1.44E-09	1.82E-17	5E-20	0.00	
Chloromethane	C	6.30E-03	1.68E-07	2.13E-15	1E-17	0.00	
Chrysene	B2	3.10E-03	1.26E-04	5.08E-13	2E-15	0.00	
Dibenz(a,h)anthracene	B2	3.10E+00	5.42E-06	2.18E-14	7E-14	0.0	
Dibenzofuran	D	1.54E-04	1.95E-12				
Diethylphthalate	D	5.42E-06	2.18E-14				
Dimethylphthalate	D	1.14E-05	4.57E-14				
Di-n-butylphthalate	D	1.25E-05	5.02E-14				
Di-n-octylphthalate	D	3.72E-05	4.71E-13				
Ethylbenzene	D						

Table D-21. ICDF office worker scenario (63 m from treatment area)—potential excess lifetime cancer risk.

Constituent	WOE	Sf <sup>1</sup>	EPC (mg/kg)	Inhalation		% Contribution
				CDI (mg/kg-day)	ELCR	
Famphur			2.77E-08	1.11E-16		
Fluoranthene	D	3.63E-04	1.46E-12			
Fluorene	D	8.74E-05	3.52E-13			
Hexachlorobenzene	B2	5.42E-06	2.18E-14	4E-14	0.00	
Hexachlorobutadiene	C	9.84E-06	3.96E-14	3E-15	0.00	
Hexachlorocyclopentadiene	D	5.42E-06	2.18E-14			
Hexachloroethane	C	1.40E-02	5.42E-06	2.18E-14	3E-16	0.00
Indeno(1,2,3-cd)pyrene	B2	3.10E-01	5.42E-06	2.18E-14	7E-15	0.00
Isobutyl alcohol		8.95E-09	3.60E-17			
Isophorone	C	9.50E-04	5.42E-06	2.18E-14	2E-17	0.00
Kepone		1.80E+01	4.72E-05	1.90E-13	3E-12	0
Methyl Acetate			2.30E-07	2.92E-15		
Methylene Chloride	B2	1.65E-03	3.98E-05	5.04E-13	8E-16	0.00
Naphthalene	C	2.02E-04	2.56E-12			
Nitrobenzene	B2	5.42E-06	6.86E-14			
N-Nitroso-di-n-propylamine	B2	7.00E+00	5.42E-06	2.18E-14	2E-13	0.0
N-Nitrosodiphenyl amine	B2	4.90E-03	5.42E-06	2.18E-14	1E-16	0.00
Pentachlorophenol	B2	1.20E-01	2.66E-05	1.07E-13	1E-14	0.00
Phenanthrene	D		5.56E-04	2.24E-12		
Phenol	D		3.80E-05	1.53E-13		
Pyrene	D	1.21E-04	4.85E-13			
Styrene	C	4.88E-10	6.18E-18			
Tetrachloroethene	C-B2	2.03E-03	4.59E-06	5.81E-14	1E-16	0.00
Toluene	D	4.67E-04	5.92E-12			
Trichloroethene	B2	6.00E-03	3.43E-05	4.34E-13	3E-15	0.00
Xylene (ortho)		1.85E-06	2.34E-14			
Xylene (total)	D		1.64E-03	2.08E-11		
Aluminum		3.37E+00	1.36E-08			
Antimony	D	2.78E-03	1.12E-11			
Arsenic	A	1.51E+01	2.69E-03	1.08E-11	2E-10	5
Barium	D	8.54E-02	3.44E-10			
Beryllium	B1	1.37E-04	5.51E-13	5E-12	0	
Boron	D	8.78E-02	3.54E-10			
Cadmium	B1	1.71E-03	6.87E-12	4E-11	1	
Chromium	A	4.20E+01	1.96E-02	7.89E-11	3E-09	94
Cobalt		2.87E-03	1.16E-11			

**Table D-21. ICDF office worker scenario (63 m from treatment area)—potential excess lifetime cancer risk.**

Constituent		WOE (mg/kg-day) <sup>-1</sup>	Sf <sub>i</sub>	Inhalation			% Contribution
				EPC (mg/kg)	CDI (mg/kg-day)	ELCR	
Copper	D	1.42E-02	5.73E-11				
Cyanide		1.60E-04	6.45E-13				
Dysprosium		2.82E-02	1.14E-10				
Fluoride		1.84E-03	7.41E-12				
Iron		4.88E+00	1.96E-08				
Manganese	D	9.84E-02	3.96E-10				
Mercury	D	4.50E-03	1.81E-11				
Molybdenum		4.84E-03	1.95E-11				
Nickel	D	9.36E-03	3.77E-11				
Selenium	D	4.03E-04	1.62E-12				
Silver	D	4.68E-03	1.88E-11				
Strontium		8.66E-03	3.49E-11				
Thallium	D	1.76E-04	7.10E-13				
Vanadium		1.01E-02	4.07E-11				
Zinc	D	9.90E-02	3.98E-10				
<b>Estimated Total Risk =</b>				4E-09	100		

Guide to Appendix D Table Abbreviations:

ABSD = Dermal Absorption Factor	SF = slope factor
ABSGi = Gastrointestinal Absorption Factor	SFD = Dermal Slope Factor
CDI = Chronic Daily Intake	SFI = Inhalation Slope Factor
ELCR = Excess Lifetime Cancer Risk	SFO = Oral Slope Factor
EPC = Exposure Point Concentration	URF = Inhalation Unit Risk Factor
HI = hazard index	WOE = Weight of Evidence
HQ = hazard quotient	Cancer WOE Classifications:
IC = Inhalation Concentration	Group A: Human carcinogen.
NA = not available	Group B: Probably human carcinogen.
Rf <sub>C</sub> = Reference Concentration	B1 - indicates that limited human data are available.
RfD <sub>D</sub> = Dermal Reference Dose	B2 - indicates sufficient evidence in animals and inadequate or no evidence in humans.
RfD <sub>I</sub> = Inhalation Reference Dose	Group C: Possible human carcinogen.
RfD <sub>O</sub> = Oral Reference Dose	Group D: Not classifiable.

**Table D-22. ICDF office worker scenario (63 m from treatment area)—potential noncarcinogenic risk.**

Constituent	Inhalation			% Contribution		
	RfD <sub>i</sub> (mg/kg-day)	EPC (mg/kg)	CDI (mg/kg-day)	HQ		%
1,1,1-Trichloroethane	2.86E-01	7.47E-06	4.41E-13	1.54E-12	8.15E-07	
1,1,2,2-Tetrachloroethane	6.00E-02	2.35E-08	1.39E-15	2.32E-14	1.22E-08	
1,1,2-Trichloroethane	4.00E-03	1.15E-07	6.81E-15	1.70E-12	8.99E-07	
1,1-Dichloroethane	1.43E-01	1.11E-06	6.58E-14	4.61E-13	2.43E-07	
1,1-Dichloroethene	9.00E-03	7.04E-07	4.16E-14	4.62E-12	2.44E-06	
1,2,4-Trichlorobenzene	5.70E-02	5.42E-06	3.20E-13	5.62E-12	2.96E-06	
1,2-Dichlorobenzene	5.71E-02	5.42E-06	3.20E-13	5.60E-12	2.96E-06	
1,2-Dichloroethane	1.40E-03	2.56E-09	1.51E-16	1.08E-13	5.71E-08	
1,2-Dichloroethene (total)	1.00E-02	1.54E-07	9.12E-15	9.12E-13	4.82E-07	
1,3-Dichlorobenzene	9.00E-04	5.42E-06	3.20E-13	3.56E-10	1.88E-04	
1,4-Dichlorobenzene	2.29E-01	2.14E-04	1.27E-11	5.53E-11	2.92E-05	
1,4-Dioxane		8.95E-09	1.68E-16			
2,4,5-Trichlorophenol	1.00E-01	2.12E-05	3.99E-13	3.99E-12	2.11E-06	
2,4,6-Trichlorophenol		8.69E-06	1.63E-13			
2,4-Dichlorophenol	3.00E-03	1.03E-05	1.93E-13	6.44E-11	3.40E-05	
2,4-Dimethylphenol	2.00E-02	8.69E-06	1.63E-13	8.16E-12	4.31E-06	
2,4-Dinitrophenol	2.00E-03	2.42E-05	4.55E-13	2.28E-10	1.20E-04	
2,4-Dinitrotoluene	2.00E-03	5.42E-06	1.02E-13	5.09E-11	2.69E-05	
2,6-Dinitrotoluene	1.00E-03	9.84E-06	1.85E-13	1.85E-10	9.77E-05	
2-Butanone	2.86E-01	1.18E-05	6.95E-13	2.43E-12	1.29E-06	
2-Chloronaphthalene	8.00E-02	5.42E-06	3.20E-13	4.00E-12	2.11E-06	
2-Chlorophenol	5.00E-03	8.69E-06	5.14E-13	1.03E-10	5.42E-05	
2-Hexanone	1.40E-03	1.28E-06	2.41E-14	1.72E-11	9.10E-06	
2-Methylnaphthalene		2.44E-04	1.44E-11			
2-Methylphenol	5.00E-02	9.82E-06	1.85E-13	3.69E-12	1.95E-06	
2-Nitroaniline	5.71E-05	1.29E-05	7.65E-13	1.34E-08	0.0071	
2-Nitrophenol	8.00E-03	8.69E-06	1.63E-13	2.04E-11	1.08E-05	
3,3'-Dichlorobenzidine		5.42E-06	1.02E-13			
3-Nitroaniline	5.71E-05	1.29E-05	7.65E-13	1.34E-08	0.0071	
4,6-Dinitro-2-methylphenol	2.00E-03	2.12E-05	3.99E-13	1.99E-10	1.05E-04	
4-Chloroaniline	4.00E-03	1.94E-05	3.65E-13	9.12E-11	4.82E-05	
4-Methyl-2-Pentanone	2.29E-02	1.41E-05	8.34E-13	3.65E-11	1.93E-05	
4-Methylphenol	5.00E-03	1.84E-05	3.45E-13	6.90E-11	3.64E-05	
4-Nitroaniline	5.71E-05	1.29E-05	7.65E-13	1.34E-08	0.0071	

Table D-22. ICDF office worker scenario (63 m from treatment area)—potential noncarcinogenic risk.

Constituent	Inhalation			Contribution %
	RfD <sub>i</sub> (mg/kg-day)	EPC (mg/kg)	CDI (mg/kg-day)	
4-Nitrophenol	8.00E-03	2.45E-05	4.61E-13	5.76E-11
Acenaphthene	6.00E-02	9.63E-05	5.69E-12	9.48E-11
Acenaphthylene	6.00E-02	9.84E-06	5.82E-13	9.70E-12
Acetone	1.00E-01	2.95E-04	1.75E-11	1.75E-10
Acetonitrile	1.70E-02	8.95E-09	5.29E-16	3.11E-14
Acrolein	5.71E-06	4.31E-09	2.55E-16	4.46E-11
Acrylonitrile	5.71E-04	4.31E-09	2.55E-16	4.46E-13
Anthracene	3.00E-01	1.52E-04	9.01E-12	3.00E-11
Aramite	5.00E-02	5.45E-08	1.02E-15	2.05E-14
Aroclor-1016	7.00E-05	3.66E-06	6.87E-14	9.82E-10
Aroclor-1254	2.00E-05	6.11E-05	1.15E-12	5.74E-08
Aroclor-1260		3.43E-04	6.44E-12	0.030
Aroclor-1268		2.96E-05	5.56E-13	
Benzene	1.71E-03	2.87E-04	1.70E-11	9.93E-09
Benzidine	3.00E-03	1.38E-07	2.60E-15	8.66E-13
Benzo(a)anthracene		1.20E-04	2.26E-12	
Benzo(a)pyrene		4.99E-05	9.38E-13	0.0052
Benzo(b)fluoranthene		8.54E-05	1.60E-12	
Benzo(g,h,i)perylene		5.42E-06	1.02E-13	3.39E-12
Benzo(k)fluoranthene		8.85E-06	1.66E-13	1.79E-06
Benzoic acid	4.00E+00	4.07E-06	7.65E-14	1.91E-14
bis(2-Chloroethyl)ether		5.42E-06	3.20E-13	1.01E-08
bis(2-Chloroisopropyl)ether	4.00E-02	5.42E-06	3.20E-13	
bis(2-Ethylhexyl)phthalate	2.20E-02	7.00E-05	1.32E-12	5.98E-11
Butylbenzylphthalate	2.00E-01	3.23E-05	6.07E-13	3.04E-12
Carbazole		1.54E-05	2.89E-13	1.60E-06
Carbon Disulfide	2.00E-01	2.17E-05	1.28E-12	6.40E-12
Chlorobenzene	1.70E-02	3.13E-06	1.85E-13	1.09E-11
Chloroethane	2.86E+00	1.44E-09	8.49E-17	2.97E-17
Chloromethane	8.60E-02	1.68E-07	9.92E-15	1.15E-13
Chrysene		1.26E-04	2.37E-12	3.38E-06
Dibenz(a,h)anthracene		5.42E-06	1.02E-13	5.74E-06
Dibenzofuran	4.00E-03	1.54E-04	9.12E-12	2.28E-09
Diethylphthalate	8.00E-01	5.42E-06	1.02E-13	6.72E-08

**Table D-22. ICDF office worker scenario (63 m from treatment area)—potential noncarcinogenic risk.**

Constituent	RfD <sub>i</sub> (mg/kg-day)	Inhalation			Contribution %
		EPC (mg/kg)	CDI (mg/kg-day)	HQ	
Dimethylphthalate	1.00E+01	5.42E-06	1.02E-13	1.02E-14	5.37E-09
Di-n-butylphthalate	1.00E-01	1.14E-05	2.13E-13	2.13E-12	1.13E-06
Di-n-octylphthalate	2.00E-02	1.25E-05	2.34E-13	1.17E-11	6.19E-06
Ethylbenzene	2.90E-01	3.72E-05	2.20E-12	7.57E-12	4.00E-06
Famphur	4.00E-02	2.77E-08	5.20E-16		
Fluoranthene	4.00E-02	3.63E-04	6.82E-12	1.70E-10	9.00E-05
Fluorene	8.00E-04	8.74E-05	1.64E-12	4.10E-11	2.17E-05
Hexachlorobenzene	5.42E-06	1.02E-13	1.27E-10	6.72E-05	
Hexachlorobutadiene	9.84E-06	1.85E-13	6.16E-10	3.26E-04	
Hexachlorocyclopentadiene	5.42E-06	1.02E-13	5.09E-09	0.0027	
Hexachloroethane	1.00E-03	5.42E-06	1.02E-13	1.02E-10	5.37E-05
Indeno(1,2,3-cd)pyrene					
Isobutyl alcohol	3.00E-01	8.95E-09	1.68E-16	5.60E-16	2.96E-10
Isophorone	2.00E-01	5.42E-06	1.02E-13	5.09E-13	2.69E-07
Kepone					
Methyl Acetate	1.00E+00	2.30E-07	1.36E-14	1.36E-14	7.19E-09
Methylene Chloride	8.57E-01	3.98E-05	2.35E-12	2.74E-12	1.45E-06
Naphthalene	8.57E-04	2.02E-04	1.20E-11	1.40E-08	0.0074
Nitrobenzene	5.71E-04	5.42E-06	3.20E-13	5.60E-10	2.96E-04
N-Nitroso-di-n-propylamine					
N-Nitrosodiphenylamine					
Pentachlorophenol	3.00E-02	2.66E-05	5.00E-13	1.67E-11	8.80E-06
Phenanthrene	3.00E-01	5.56E-04	1.04E-11	3.48E-11	1.84E-05
Phenol	6.00E-01	3.80E-05	7.13E-13	1.19E-12	6.28E-07
Pyrene	3.00E-02	1.21E-04	2.26E-12	7.55E-11	3.99E-05
Styrene	2.90E-01	4.88E-10	2.88E-17	9.95E-17	5.25E-11
Tetrachloroethene	1.14E-01	4.59E-06	2.71E-13	2.38E-12	1.26E-06
Toluene	1.10E-01	4.67E-04	2.76E-11	2.51E-10	1.33E-04
Trichloroethene	6.00E-03	3.43E-05	2.03E-12	3.38E-10	1.78E-04
Xylene (ortho)	2.00E-01	1.85E-06	1.09E-13	5.46E-13	2.88E-07
Xylene (total)	2.00E-01	1.64E-03	9.72E-11	4.86E-10	2.57E-04
Aluminum	1.40E-03	3.37E+00	6.33E-08	4.52E-05	24
Antimony	2.78E-03	5.21E-11			
Arsenic	2.69E-03	5.05E-11			

Table D-22. ICDF office worker scenario (63 m from treatment area)—potential noncarcinogenic risk.

Constituent	RfD <sub>i</sub> (mg/kg-day)	EPC (mg/kg)	Inhalation		Contribution %
			CDI (mg/kg-day)	HQ	
Barium	1.43E-04	8.54E-02	1.60E-09	1.12E-05	5.9
Beryllium	5.71E-06	1.37E-04	2.57E-12	4.50E-07	0.24
Boron	5.71E-03	8.78E-02	1.65E-09	2.89E-07	0.15
Cadmium		1.71E-03	3.21E-11		
Chromium		1.96E-02	3.68E-10		
Cobalt		2.87E-03	5.40E-11		
Copper		1.42E-02	2.67E-10		
Cyanide	8.57E-04	1.60E-04	3.01E-12	3.51E-09	0.0019
Dysprosium		2.82E-02	5.31E-10		
Fluoride		1.84E-03	3.46E-11		
Iron		4.88E+00	9.16E-08		
Manganese	1.40E-05	9.84E-02	1.85E-09	1.32E-04	70
Mercury		4.50E-03	8.45E-11		
Molybdenum		4.84E-03	9.10E-11		
Nickel		9.36E-03	1.76E-10		
Selenium		4.03E-04	7.56E-12		
Silver		4.68E-03	8.80E-11		
Strontium		8.66E-03	1.63E-10		
Thallium		1.76E-04	3.31E-12		
Vanadium		1.01E-02	1.90E-10		
Zinc		9.90E-02	1.86E-09		
<b>Total HI</b>				1.89E-04	100

Guide to Appendix D Table Abbreviations:

- ABSD = Dermal Absorption Factor
- ABSgi = Gastrointestinal Absorption Factor
- CDI = Chronic Daily Intake
- ELCR = Excess Lifetime Cancer Risk
- EPC = Exposure Point Concentration
- SF = slope factor
- SFd = Dermal Slope Factor
- Sfi = Inhalation Slope Factor
- SFO = Oral Slope Factor
- URF = Inhalation Unit Risk Factor

**Table D-22. ICDF office worker scenario (63 m from treatment area)—potential noncarcinogenic risk.**

Constituent	RfD <sub>i</sub> (mg/kg-day)	EPC (mg/kg)	Inhalation		HQ	% Contribution				
			CDI (mg/kg-day)	CDI						
<b>HI = hazard index</b>										
<b>HQ = hazard quotient</b>										
<b>IC = Inhalation Concentration</b>										
<b>NA = not available</b>										
<b>Rf<sub>C</sub> = Reference Concentration</b>										
<b>RfD = Dermal Reference Dose</b>										
<b>RfDi = Inhalation Reference Dose</b>										
<b>RfDo = Oral Reference Dose</b>										
<b>WOE = Weight of Evidence</b>										
<b>Cancer WOE Classifications:</b>										
Group A: Human carcinogen.										
Group B: Probably human carcinogen.										
B1 - indicates that limited human data are available.										
B2 - indicates sufficient evidence in animals and inadequate or no evidence in humans.										
Group C: Possible human carcinogen.										
Group D: Not classifiable.										

Table D-23. INEEL worker scenario—potential excess lifetime cancer risk.

Constituent	WOE	Sf <sup>1</sup>	EPC (mg/kg)	Inhalation		% Contribution
				CDI (mg/kg-day)	ELCR (mg/kg-day)	
1,1,1-Trichloroethane	D		1.57E-02	1.17E-09		
1,1,2,2-Tetrachloroethane	C	2.03E-01	4.95E-05	3.70E-12	8E-13	2.51E-04
1,1,2-Trichloroethane	C	5.60E-02	2.42E-04	1.81E-11	1E-12	3.38E-04
1,1-Dichloroethane	C		2.34E-03	1.75E-10		
1,1-Dichloroethene	C	1.75E-01	1.48E-03	1.11E-10	2E-11	6.46E-03
1,2,4-Trichlorobenzene	D		1.14E-02	6.80E-10		
1,2-Dichlorobenzene	D		1.14E-02	8.50E-10		
1,2-Dichloroethane	B2	9.10E-02	5.38E-06	4.02E-13	4E-14	1.22E-05
1,2-Dichloroethene (total)			3.24E-04	2.42E-11		
1,3-Dichlorobenzene	D		1.14E-02	8.50E-10		
1,4-Dichlorobenzene	C	2.20E-02	4.50E-01	3.36E-08	7E-10	0.2472
1,4-Dioxane	B2	1.10E-02	1.88E-05	3.03E-15	3E-17	1.11E-08
2,4,5-Trichlorophenol			4.46E-02	7.18E-12		
2,4,6-Trichlorophenol	B2	1.09E-02	1.83E-02	2.94E-12	3E-14	1.07E-05
2,4-Dichlorophenol			2.16E-02	3.48E-12		
2,4-Dimethylphenol			1.83E-02	2.94E-12		
2,4-Dinitrophenol	B2		5.09E-02	8.20E-12		
2,4-Dinitrotoluene	B2		1.14E-02	1.83E-12		
2,6-Dinitrotoluene	B2		2.07E-02	3.33E-12		
2-Butanone	D		2.47E-02	1.39E-09		
2-Chloronaphthalene			1.14E-02	3.55E-10		
2-Chlorophenol			1.83E-02	1.36E-09		
2-Hexanone			2.70E-03	4.34E-13		
2-Methylnaphthalene			5.12E-01	6.89E-09		
2-Methylphenol	C		2.06E-02	3.32E-12		
2-Nitroaniline			2.72E-02	2.03E-09		
2-Nitrophenol			1.83E-02	2.94E-12		
3,3'-Dichlorobenzidine	B2	4.50E-01	1.14E-02	1.83E-12	8E-13	2.76E-04
3-Nitroaniline			2.72E-02	2.03E-09		
4,6-Dinitro-2-methylphenol			4.46E-02	7.18E-12		
4-Chloroaniline			4.08E-02	6.57E-12		
4-Methyl-2-Pentanone	C		2.96E-02	2.21E-09		
4-Methylphenol			3.86E-02	6.21E-12		
4-Nitroaniline	D		2.72E-02	2.03E-09		
4-Nitrophenol			5.16E-02	8.30E-12		
Acenaphthene			2.02E-01	2.85E-09		

Table D-23. INEEL worker scenario—potential excess lifetime cancer risk.

Constituent		WOE	Sf <sub>i</sub> (mg/kg-day) <sup>-1</sup>	EPC (mg/kg)	Inhalation		%
					CDI (mg/kg-day)	ELCR Contribution	
Acenaphthylene	D	2.07E-02	3.92E-10				
Acetone	D	6.20E-01	4.64E-08				
Acetonitrile	C	1.88E-05	1.03E-12				
Acrolein	B1	9.06E-06	6.77E-13				
Acrylonitrile	D	9.06E-06	6.77E-13	2E-13	5.38E-05		
Anthracene	D	3.20E-01	1.22E-09				
Aramid	B2	1.15E-04	1.84E-14	5E-16	1.53E-07		
Aroclor-1016	B2	7.69E-03	1.24E-12	9E-14	2.90E-05		
Aroclor-1254	B2	1.28E-01	2.07E-11	4E-11	0.014		
Aroclor-1260	B2	7.21E-01	1.16E-10	2E-10	0.078		
Aroclor-1268	B2	6.22E-02	1.00E-11	2E-11	0.0067		
Benzene	A	6.03E-01	4.51E-08	1E-09	0.4067		
Benzidine	A	2.91E-04	4.68E-14	1E-11	0.00		
Benzof(a)anthracene	B2	2.53E-01	4.07E-11	1E-11	0.0042		
Benz(a)pyrene	B2	1.05E-01	1.69E-11	5E-11	0.017		
Benz(b)fluoranthene	B2	1.79E-01	2.89E-11	9E-12	0.0030		
Benz(g,h,i)perylene	D	1.14E-02	1.83E-12				
Benz(k)fluoranthene	B2	1.86E-02	2.99E-12	9E-14	3.10E-05		
Benzoic acid	D	8.56E-03	1.38E-12				
bis(2-Chloroethyl)ether	B2	1.14E-02	3.61E-10	4E-10	0.1394		
bis(2-Chloroisopropyl)ether	C	1.14E-02	8.50E-10	3E-11	9.94E-03		
bis(2-Ethylhexyl)phthalate	B2	1.47E-01	2.37E-11	3E-13	1.11E-04		
Butylbenzylphthalate	C	6.79E-02	1.09E-11				
Carbazole	B2	3.23E-02	5.21E-12	1E-13	3.48E-05		
Carbon Disulfide	D	4.55E-02	3.40E-09				
Chlorobenzene	D	6.57E-03	4.91E-10				
Chloroethane	C	3.02E-06	2.25E-13	7E-16	2.18E-07		
Chloromethane	C	3.53E-04	2.64E-11	2E-13	5.55E-05		
Chrysene	B2	2.65E-01	4.27E-11	1E-13	4.42E-05		
Dibenz(a,h)anthracene	B2	1.14E-02	1.83E-12	6E-12	0.0019		
Dibenzofuran	D	3.24E-01	1.31E-09				
Diethylphthalate	D	1.14E-02	1.83E-12				
Dimethylphthalate	D	1.14E-02	1.83E-12				
Di-n-butylphthalate	D	2.39E-02	3.84E-12				
Di-n-octylphthalate	D	2.62E-02	4.22E-12				
Ethylbenzene	D	7.81E-02	5.83E-09				

Table D-23. INEEL worker scenario—potential excess lifetime cancer risk.

Constituent	Sf <sub>i</sub>	WOE	(mg/kg-day) <sup>-1</sup>	EPC (mg/kg)	Inhalation		% Contribution
					CDI (mg/kg-day)	ELCR	
Famphur	D	D	5.81E-05	9.36E-15			
Fluoranthene	D	D	7.62E-01	1.23E-10			
Fluorene	B2	1.61E-00	1.84E-01	2.96E-11			
Hexachlorobenzene	C	7.80E-02	2.07E-02	1.83E-12	3E-12	0.0010	
Hexachlorobutadiene	D	D	1.14E-02	1.83E-12	3.33E-13	3E-13	8.68E-05
Hexachlorocyclopentadiene	C	1.40E-02	1.14E-02	1.83E-12	3E-14	8.57E-06	
Hexachloroethane	B2	3.10E-01	1.14E-02	1.83E-12	6E-13	1.90E-04	
Indeno(1,2,3-cd)pyrene	B2						
Isobutyl alcohol	C	9.50E-04	1.14E-02	1.83E-12	2E-15	5.82E-07	
Isophorone	C	1.80E+01	9.92E-02	1.60E-11	3E-10	0.10	
Kepone							
Methyl Acetate	B2	1.65E-03	4.84E-04	2.56E-11			
Methylene Chloride	C	D	8.36E-02	6.25E-09	1E-11	3.43E-03	
Naphthalene	B2	D	4.25E-01	2.43E-08			
Nitrobenzene	B2	7.00E+00	1.14E-02	4.49E-10			
N-Nitroso-di-n-propylamine	B2	4.90E-03	1.14E-02	1.83E-12	1E-11	0.0043	
N-Nitrosodiphenylamine	B2	1.20E+01	5.59E-02	1.83E-12	9E-15	3.00E-06	
Pentachlorophenol	D	D	1.17E+00	9.00E-12	1E-12	3.61E-04	
Phenanthrene	D	D	7.98E-02	1.88E-10			
Phenol	D	D	1.28E-11				
Pyrene	D	C	2.53E-01	4.08E-11			
Styrene	C	C-B2	1.03E-06	7.66E-14			
Tetrachloroethene	D	D	9.64E-03	7.20E-10	1E-12	4.88E-04	
Toluene	B2	6.00E-03	7.20E-02	5.38E-09	3E-11	1.08E-02	
Trichloroethene	D	D	3.88E-03	2.90E-10			
Xylene (ortho)	D	D	3.45E+00	2.58E-07			
Xylene (total)	D	D	7.08E+03	1.14E-06			
Aluminum	D	D	5.83E+00	9.39E-10			
Antimony	A	1.51E+01	5.65E+00	9.10E-10	1E-08	4.578	
Arsenic	D	D	1.79E+02	2.89E-08			
Barium	B1	8.40E+00	2.87E-01	4.63E-11	4E-10	0.1299	
Beryllium	D	D	1.85E+02	2.97E-08			
Boron	B1	6.30E+00	3.59E+00	5.77E-10	4E-09	1.2	
Cadmium	A	4.20E+01	4.12E+01	6.63E-09	3E-07	93	
Chromium							
Cobalt							
				6.04E+00	9.72E-10		

Table D-23. INEEL worker scenario—potential excess lifetime cancer risk.

Constituent	WOE	Sfi	Inhalation		
			EPC	CDI	% Contribution
Copper	D	2.99E+01	(mg/kg)	(mg/kg-day)	
Cyanide		3.37E-01	4.82E-09		
Dysprosium		5.42E-11			
Fluoride		5.93E+01	9.56E-09		
Iron		3.87E+00	6.23E-10		
Manganese	D	1.02E+04	1.65E-06		
Mercury	D	2.07E+02	3.33E-08		
Molybdenum		9.45E+00	1.52E-09		
Nickel	D	1.02E+01	1.64E-09		
Selenium	D	1.97E+01	3.16E-09		
Silver	D	8.46E-01	1.36E-10		
Strontrium		9.84E+00	1.58E-09		
Thallium	D	1.82E+01	2.93E-09		
Vanadium		3.70E-01	5.96E-11		
Zinc	D	2.12E+01	3.42E-09		
<b>Estimated Total Risk =</b>			2.08E+02	3.35E-08	
				3E-07	100

Guide to Appendix D Table Abbreviations:

ABSd = Dermal Absorption Factor	SF = slope factor
ABSGi = Gastrointestinal Absorption Factor	SFd = Dermal Slope Factor
CDI = Chronic Daily Intake	Sfi = Inhalation Slope Factor
ELCR = Excess Lifetime Cancer Risk	SFo = Oral Slope Factor
EPC = Exposure Point Concentration	URF = Inhalation Unit Risk Factor
HI = hazard index	WOE = Weight of Evidence
HQ = hazard quotient	Cancer WOE Classifications:
IC = Inhalation Concentration	Group A: Human carcinogen.
NA = not available	Group B: Probably human carcinogen.
RfC = Reference Concentration	B1 - indicates that limited human data are available.
RfDd = Dermal Reference Dose	B2 - indicates sufficient evidence in animals and inadequate or no evidence in humans.
RfDi = Inhalation Reference Dose	Group C: Possible human carcinogen.
RfDo = Oral Reference Dose	Group D: Not classifiable.

Table D-24. INEEL worker scenario—potential noncarcinogenic risk.

Constituent	RfD <sub>i</sub> (mg/kg-day)	EPC (mg/kg)	Inhalation			%
			CDI (mg/kg-day)	HQ	Contribution	
1,1,1-Trichloroethane	2.86E-01	1.57E-02	5.47E-09	1.91E-08	1.15E-04	
1,1,2-Tetrachloroethane	6.00E-02	4.95E-05	1.72E-11	2.87E-10	1.72E-06	
1,1,2-Trichloroethane	4.00E-03	2.42E-04	8.44E-11	2.11E-08	1.26E-04	
1,1-Dichloroethane	1.43E-01	2.34E-03	8.16E-10	5.71E-09	3.42E-05	
1,1-Dichloroethene	9.00E-03	1.48E-03	5.16E-10	5.73E-08	3.43E-04	
1,2,4-Trichlorobenzene	5.70E-02	1.14E-02	3.17E-09	5.57E-08	3.34E-04	
1,2-Dichlorobenzene	5.71E-02	1.14E-02	3.97E-09	6.94E-08	4.16E-04	
1,2-Dichloroethane	1.40E-03	5.38E-06	1.88E-12	1.34E-09	8.03E-06	
1,2-Dichloroethene (total)	1.00E-02	3.24E-04	1.13E-10	1.13E-08	6.77E-05	
1,3-Dichlorobenzene	9.00E-04	1.14E-02	3.97E-09	4.41E-06	0.026	
1,4-Dichlorobenzene	2.29E-01	4.50E-01	1.57E-07	6.85E-07	0.0041	
1,4-Dioxane						
2,4,5-Trichlorophenol	1.00E-01	4.46E-02	3.35E-11	3.35E-10	2.01E-06	
2,4,6-Trichlorophenol						
2,4-Dichlorophenol	3.00E-03	2.16E-02	1.37E-11	5.41E-09	3.24E-05	
2,4-Dimethylphenol	2.00E-02	1.83E-02	1.62E-11	6.86E-10	4.11E-06	
2,4-Dinitrophenol	2.00E-03	5.09E-02	3.83E-11	1.91E-08	1.15E-04	
2,4-Dinitrotoluene	2.00E-03	1.14E-02	8.55E-12	4.27E-09	2.56E-05	
2,6-Dinitrotoluene	1.00E-03	2.07E-02	1.55E-11	1.55E-08	9.31E-05	
2-Butanone	2.86E-01	2.47E-02	6.47E-09	2.26E-08	1.36E-04	
2-Chloronaphthalene	8.00E-02	1.14E-02	1.66E-09	2.07E-08	1.24E-04	
2-Chlorophenol	5.00E-03	1.83E-02	6.36E-09	1.27E-06	0.0076	
2-Hexanone	1.40E-03	2.70E-03	2.03E-12	1.45E-09	8.67E-06	
2-Methylnaphthalene						
2-Methylphenol	5.00E-02	2.06E-02	1.55E-11	3.10E-10	1.86E-06	
2-Nitroaniline	5.71E-05	2.72E-02	9.49E-09	1.66E-04	0.99	
2-Nitrophenol	8.00E-03	1.83E-02	1.37E-11	1.71E-09	1.03E-05	
3,3'-Dichlorobenzidine						
3-Nitroaniline	5.71E-05	2.72E-02	9.49E-09	1.66E-04	0.99	
4,6-Dinitro-2-methylphenol	2.00E-03	4.46E-02	3.35E-11	1.68E-08	1.00E-04	
4-Chloroaniline	4.00E-03	4.08E-02	3.07E-11	7.66E-09	4.59E-05	
4-Methyl-2-Pentanone	2.29E-02	2.96E-02	1.03E-08	4.52E-07	0.0027	
4-Methylphenol	5.00E-03	3.86E-02	2.90E-11	5.80E-09	3.47E-05	
4-Nitroaniline	5.71E-05	2.72E-02	9.49E-09	1.66E-04	0.99	
4-Nitrophenol	8.00E-03	5.16E-02	3.87E-11	4.84E-09	2.90E-05	

Table D-24. INEEL worker scenario—potential noncarcinogenic risk.

Constituent	RfD <sub>i</sub> (mg/kg-day)	EPC (mg/kg)	Inhalation		% Contribution
			CDI (mg/kg-day)	HQ	
Acenaphthene	6.00E-02	2.02E-01	1.33E-08	2.22E-07	0.0013
Acenaphthylene	6.00E-02	2.07E-02	1.83E-09	3.05E-08	1.83E-04
Acetone	1.00E-01	6.20E-01	2.16E-07	2.16E-06	0.013
Acetonitrile	1.70E-02	1.88E-05	4.82E-12	2.84E-10	1.70E-06
Acrolein	5.71E-06	9.06E-06	3.16E-12	5.53E-07	0.0033
Acrylonitrile	5.71E-04	9.06E-06	3.16E-12	5.53E-09	3.31E-05
Anthracene	3.00E-01	3.20E-01	5.71E-09	1.90E-08	1.14E-04
Aramite	5.00E-02	1.15E-04	8.61E-14	1.72E-12	1.03E-08
Aroclor-1016	7.00E-05	7.69E-03	5.78E-12	8.25E-08	4.94E-04
Aroclor-1254	2.00E-05	1.28E-01	9.65E-11	4.82E-06	0.029
Aroclor-1260		7.21E-01	5.42E-10		
Aroclor-1268		6.22E-02	4.67E-11		
Benzene	1.71E-03	6.03E-01	2.10E-07	1.23E-04	0.74
Benzidine	3.00E-03	2.91E-04	2.18E-13	7.28E-11	4.36E-07
Benzo(a)anthracene		2.53E-01	1.90E-10		
Benzo(a)pyrene		1.05E-01	7.88E-11		
Benzo(b)fluoranthene		1.79E-01	1.35E-10		
Benzo(g,h,i)perylene	3.00E-02	1.14E-02	8.55E-12	2.85E-10	1.71E-06
Benzo(k)fluoranthene		1.86E-02	1.40E-11		
Benzoic acid	4.00E+00	8.56E-03	6.43E-12	1.61E-12	9.63E-09
bis(2-Chloroethyl)ether		1.14E-02	1.68E-09		
bis(2-Chloroisopropyl)ether	4.00E-02	1.14E-02	3.97E-09	9.92E-08	5.94E-04
bis(2-Ethylhexyl)phthalate	2.20E-02	1.47E-01	1.11E-10	5.03E-09	3.01E-05
Butylbenzylphthalate	2.00E-01	6.79E-02	5.10E-11	2.55E-10	1.53E-06
Carbazole		3.23E-02	2.43E-11		
Carbon Disulfide	2.00E-01	4.55E-02	1.59E-08	7.94E-08	4.76E-04
Chlorobenzene	1.70E-02	6.57E-03	2.29E-09	1.35E-07	8.07E-04
Chloroethane	2.86E+00	3.02E-06	1.05E-12	3.68E-13	2.21E-09
Chloromethane	8.60E-02	3.53E-04	1.23E-10	1.43E-09	8.57E-06
Chrysene		2.65E-01	1.99E-10		
Dibenz(a,h)anthracene		1.14E-02	8.55E-12		
Dibenzofuran	4.00E-03	3.24E-01	6.13E-09	1.53E-06	0.0092
Diethylphthalate	8.00E-01	1.14E-02	8.55E-12	1.07E-11	6.41E-08
Dimethylphthalate	1.00E+01	1.14E-02	8.55E-12	8.55E-13	5.12E-09
Di-n-butylphthalate	1.00E-01	2.39E-02	1.79E-11	1.79E-10	1.07E-06

Table D-24. INEEL worker scenario—potential noncarcinogenic risk.

Constituent	RfD <sub>i</sub> (mg/kg-day)	EPC (mg/kg)	Inhalation			% Contribution
			CDI (mg/kg-day)	HQ		
Di-n-octylphthalate	2.00E-02	2.62E-02	1.97E-11	9.85E-10	5.90E-06	
Ethylbenzene	2.90E-01	7.81E-02	2.72E-08	9.39E-08	5.62E-04	
Famphur		5.81E-05	4.37E-14			
Fluoranthene	4.00E-02	7.62E-01	5.73E-10	1.43E-08	8.58E-05	
Fluorene	4.00E-02	1.84E-01	1.38E-10	3.45E-09	2.07E-05	
Hexachlorobenzene	8.00E-04	1.14E-02	8.55E-12	1.07E-08	6.40E-05	
Hexachlorobutadiene	3.00E-04	2.07E-02	1.55E-11	5.18E-08	3.10E-04	
Hexachlorocyclopentadiene	2.00E-05	1.14E-02	8.55E-12	4.27E-07	0.0026	
Hexachloroethane	1.00E-03	1.14E-02	8.55E-12	8.55E-09	5.12E-05	
Indeno[1,2,3-cd]pyrene		1.14E-02	8.55E-12			
Isobutyl alcohol	3.00E-01	1.88E-05	1.41E-14	4.71E-14	2.82E-10	
Isophorone	2.00E-01	1.14E-02	8.55E-12	4.28E-11	2.56E-07	
Kepone		9.92E-02	7.45E-11			
Methyl Acetate	1.00E+00	4.84E-04	1.19E-10	1.19E-10	7.15E-07	
Methylene Chloride	8.57E-01	8.36E-02	2.92E-08	3.40E-08	2.04E-04	
Naphthalene	8.57E-04	4.25E-01	1.14E-07	1.33E-04	0.79	
Nitrobenzene	5.71E-04	1.14E-02	2.09E-09	3.66E-06	0.022	
N-Nitroso-di-n-propylamine		1.14E-02	8.55E-12			
N-Nitrosodiphenylamine		1.14E-02	8.55E-12			
Pentachlorophenol	3.00E-02	5.59E-02	4.20E-11	1.40E-09	8.39E-06	
Phenanthrene	3.00E-01	1.17E+00	8.78E-10	2.93E-09	1.75E-05	
Phenol	6.00E-01	7.98E-02	6.00E-11	9.99E-11	5.99E-07	
Pyrene	3.00E-02	2.53E-01	1.90E-10	6.34E-09	3.80E-05	
Styrene	2.90E-01	1.03E-06	3.58E-13	1.23E-12	7.39E-09	
Tetrachloroethene	1.14E-01	9.64E-03	3.36E-09	2.95E-08	1.77E-04	
Toluene	1.10E-01	9.82E-01	3.42E-07	3.11E-06	0.019	
Trichloroethene	6.00E-03	7.20E-02	2.51E-08	4.19E-06	0.025	
Xylene (ortho)	2.00E-01	3.88E-03	1.35E-09	6.77E-09	4.06E-05	
Xylene (total)	2.00E-01	3.45E+00	1.20E-06	6.02E-06	0.036	
Aluminum	1.40E-03	7.08E+03	5.32E-06	0.0038	23	
Antimony		5.83E+00	4.38E-09			
Arsenic		5.65E+00	4.25E-09			
Barium	1.43E-04	1.79E+02	1.35E-07	9.44E-04	5.7	
Beryllium	5.71E-06	2.87E-01	2.16E-10	3.78E-05	0.23	
Boron	5.71E-03	1.85E+02	1.39E-07	2.43E-05	0.15	

Table D-24. INEEL worker scenario—potential noncarcinogenic risk.

Constituent	RfD <sub>i</sub> (mg/kg-day)	EPC (mg/kg)	Inhalation		% Contribution
			CDI (mg/kg-day)	HQ	
Cadmium	3.59E+00	2.69E-09			
Chromium	4.12E+01	3.09E-08			
Cobalt	6.04E+00	4.54E-09			
Copper	2.99E+01	2.25E-08			
Cyanide	3.37E-01	2.53E-10			
Dysprosium	5.93E+01	4.46E-08			
Fluoride	3.87E+00	2.91E-09			
Iron	1.02E+04	7.70E-06			
Manganese	1.40E-05	2.07E+02	1.55E-07	0.011	66
Mercury	9.45E+00	7.10E-09			
Molybdenum	1.02E+01	7.65E-09			
Nickel	1.97E+01	1.48E-08			
Selenium	8.46E-01	6.36E-10			
Silver	9.84E+00	7.39E-09			
Strontrium	1.82E+01	1.37E-08			
Thallium	3.70E-01	2.78E-10			
Vanadium	2.12E+01	1.60E-08			
Zinc	2.08E+02	1.56E-07			
<b>Total HI</b>			0.017	100	

Guide to Appendix D Table Abbreviations:

- ABSD = Dermal Absorption Factor
- ABSGi = Gastrointestinal Absorption Factor
- CDI = Chronic Daily Intake
- ELCR = Excess Lifetime Cancer Risk
- EPC = Exposure Point Concentration
- HI = hazard index
- HQ = hazard quotient
- IC = Inhalation Concentration
- NA = not available
- SF = slope factor
- SFD = Dermal Slope Factor
- SFI = Inhalation Slope Factor
- SFO = Oral Slope Factor
- URF = Inhalation Unit Risk Factor
- WOE = Weight of Evidence
- Cancer WOE Classifications:
  - Group A: Human carcinogen.
  - Group B: Probably human carcinogen.

**Table D-24. INEEL worker scenario—potential noncarcinogenic risk.**

Constituent	RfD <sub>i</sub> (mg/kg-day)	EPC (mg/kg)	Inhalation			% Contribution			
			CDI (mg/kg-day)	HQ	%				
<i>Rf<sub>c</sub> = Reference Concentration</i>									
<i>RfD<sub>d</sub> = Dermal Reference Dose</i>									
<i>RfD<sub>i</sub> = Inhalation Reference Dose</i>									
<i>RfD<sub>o</sub> = Oral Reference Dose</i>									
<i>B1 - indicates that limited human data are available.</i>									
<i>B2 - indicates sufficient evidence in animals and inadequate or no evidence in humans.</i>									
<i>Group C: Possible human carcinogen.</i>									
<i>Group D: Not classifiable.</i>									

Table D-25. INEEL visitor scenario—potential excess lifetime cancer risk.

Constituent		WOE	Sfi (mg/kg-day) <sup>-1</sup>	EPC (mg/kg)	Inhalation		% Contribution
					CDI (mg/kg-day)	ELCR	
1,1,1-Trichloroethane	D		1.57E-03	7.95E-13			
1,1,2,2-Tetrachloroethane	C	2.03E-01	4.95E-06	2.51E-15	5E-16	1.79E-06	
1,1,2-Trichloroethane	C	5.60E-02	2.42E-05	1.23E-14	7E-16	2.42E-06	
1,1-Dichloroethane	C		2.34E-04	1.19E-13			
1,1-Dichloroethene	C	1.75E-01	1.48E-04	7.50E-14	1E-14	4.62E-05	
1,2,4-Trichlorobenzene	D		1.14E-03	5.78E-13			
1,2-Dichlorobenzene	D		1.14E-03	5.78E-13			
1,2-Dichloroethane	B2	9.10E-02	5.38E-07	2.73E-16	2E-17	8.74E-08	
1,2-Dichloroethene (total)			3.24E-05	1.64E-14			
1,3-Dichlorobenzene	D		1.14E-03	5.78E-13			
1,4-Dichlorobenzene	C	2.20E-02	4.50E-02	2.28E-11	5E-13	0.0018	
1,4-Dioxane	B2	1.10E-02	1.88E-06	3.03E-16	3E-18	1.17E-08	
2,4,5-Trichlorophenol			4.46E-03	7.18E-13			
2,4,6-Trichlorophenol	B2	1.09E-02	1.83E-03	2.95E-13	3E-15	1.13E-05	
2,4-Dichlorophenol			2.16E-03	3.48E-13			
2,4-Dimethylphenol			1.83E-03	2.95E-13			
2,4-Dinitrophenol			5.09E-03	8.20E-13			
2,4-Dinitrotoluene	B2		1.14E-03	1.84E-13			
2,6-Dinitrotoluene	B2		2.07E-03	3.33E-13			
2-Butanone	D		2.47E-03	1.25E-12			
2-Chloronaphthalene			1.14E-03	5.78E-13			
2-Chlorophenol			1.83E-03	9.27E-13			
2-Hexanone			2.70E-04	4.35E-14			
2-Methylnaphthalene			5.12E-02	2.59E-11			
2-Methylphenol	C		2.06E-03	3.32E-13			
2-Nitroaniline			1.01E-05	5.12E-15			
2-Nitrophenol			1.83E-03	2.95E-13			
3,3'-Dichlorobenzidine	B2	4.50E-01	1.14E-03	1.84E-13	8E-14	2.91E-04	
3-Nitroaniline			1.01E-05	5.12E-15			
4,6-Dinitro-2-methylphenol			4.46E-03	7.18E-13			
4-Chloroaniline			4.12E-03	6.63E-13			
4-Methyl-2-Pentanone			2.96E-03	1.50E-12			
4-Methylphenol	C		3.86E-03	6.22E-13			
4-Nitroaniline			1.01E-05	5.12E-15			
4-Nitrophenol	D		5.16E-03	8.31E-13			
Acenaphthene			2.02E-02	1.02E-11			

Table D-25. INEEL visitor scenario—potential excess lifetime cancer risk.

Constituent	WOE	Sf <sub>i</sub> (mg/kg-day) <sup>-1</sup>	EPC (mg/kg)	Inhalation		% Contribution
				CDI (mg/kg-day)	ELCR	
Acenaphthylene	D	2.07E-03	1.05E-12			
Acetone	D	5.00E-02	2.53E-11			
Acetonitrile	C	1.16E-04	5.88E-14			
Acrolein	B1	5.47E-05	2.77E-14			
Acrylonitrile	D	5.83E-05	2.95E-14	7E-15		2.48E-05
Anthracene	B2	3.20E-02	1.62E-11			
Aramite	B2	6.71E-04	1.08E-13	3E-15		9.46E-06
Aroclor-1016	B2	7.69E-04	1.24E-13	9E-15		3.06E-05
Aroclor-1254	B2	1.28E-02	2.06E-12	4E-12		0.015
Aroclor-1260	B2	2.00E+00	5.00E-02	8.05E-12		0.057
Aroclor-1268	B2	2.00E+00	6.22E-03	1.00E-12	2E-12	0.0071
Benzene	A	2.70E-02	5.00E-02	2.53E-11	7E-13	0.0024
Benzidine	A	2.30E+02	1.72E-03	2.77E-13	6E-11	0.22
Benzo(a)anthracene	B2	3.10E-01	2.53E-02	4.07E-12	1E-12	0.0045
Benzo(a)pyrene	B2	3.10E+00	1.05E-02	1.69E-12	5E-12	0.018
Benzo(b)fluoranthene	B2	3.10E-01	1.79E-02	2.88E-12	9E-13	0.0031
Benzo(g,h,i)perylene	D	1.14E-03	1.84E-13			
Benzo(k)fluoranthene	B2	3.10E-02	1.86E-03	3.00E-13	9E-15	3.27E-05
Benzoic acid	D	8.56E-04	1.38E-13			
bis(2-Chloroethyl)ether	B2	1.16E+00	1.14E-03	5.78E-13	7E-13	0.0024
bis(2-Chloroisopropyl)ether	C	3.50E-02	1.14E-03	5.78E-13	2E-14	7.12E-05
bis(2-Ethylhexyl)phthalate	B2	1.40E-02	1.47E-02	2.37E-12	3E-14	1.17E-04
Butylbenzylphthalate	C	6.79E-03	1.09E-12			
Carbazole	B2	2.00E-02	3.23E-03	5.20E-13	1E-14	3.67E-05
Carbon Disulfide	D	4.55E-03	2.30E-12			
Chlorobenzene	D	6.57E-04	3.33E-13			
Chloroethane	D	2.90E-03	1.47E-05	7.45E-15	2E-17	7.61E-08
Chloromethane	C	6.30E-03	3.53E-05	1.79E-14	1E-16	3.97E-07
Chrysene	B2	3.10E-03	2.65E-02	4.27E-12	1E-14	4.66E-05
Dibenz(a,h)anthracene	B2	3.10E+00	1.14E-03	1.84E-13	6E-13	0.0020
Dibenzofuran	D	3.24E-02	1.14E-03	1.64E-11		
Diethylphthalate	D	1.14E-03	1.84E-13			
Dimethylphthalate	D	1.14E-03	1.84E-13			
Di-n-butylphthalate	D	2.39E-03	3.85E-13			
Di-n-octylphthalate	D	2.62E-03	4.22E-13			
Ethylbenzene	D	7.81E-03	3.96E-12			

Table D-25. INEEL visitor scenario—potential excess lifetime cancer risk.

Constituent	WOE	$S_{fi}$ (mg/kg-day) <sup>-1</sup>	EPC (mg/kg)	Inhalation		% Contribution
				CDI (mg/kg-day)	ELCR	
Famphur		1.00E+01	1.61E-09			
Fluoranthene	D	7.62E-02	1.23E-11			
Fluorene	D	1.84E-02	2.96E-12			
Hexachlorobenzene	B2	1.61E+00	1.14E-03	1.84E-13	3E-13	0.0010
Hexachlorobutadiene	C	7.80E-02	2.07E-03	3.33E-13	3E-14	9.16E-05
Hexachlorocyclopentadiene	D	1.14E-03	1.84E-13			
Hexachloroethane	C	1.40E-02	1.14E-03	1.84E-13	3E-15	9.06E-06
Indeno(1,2,3-cd)pyrene	B2	3.10E-01	1.14E-03	1.84E-13	6E-14	2.01E-04
Isobutyl alcohol		1.16E-04	1.87E-14			
Isophorone	C	9.50E-04	1.14E-03	1.84E-13	2E-16	6.15E-07
Kepone		1.80E+01	9.92E-03	1.60E-12	3E-11	0.10
Methyl Acetate		4.84E-05	2.45E-14			
Methylene Chloride	B2	1.65E-03	2.72E-03	1.38E-12	2E-15	7.99E-06
Naphthalene	C	4.25E-02	2.15E-11			
Nitrobenzene	B2	1.14E-03	5.78E-13			
N-Nitroso-di-n-propylamine	B2	7.00E+00	1.14E-03	1.84E-13	1E-12	0.0045
N-Nitrosodiphenylamine	B2	4.90E-03	1.14E-03	1.84E-13	9E-16	3.17E-06
Pentachlorophenol	B2	1.20E-01	5.59E-03	9.00E-13	1E-13	3.81E-04
Phenanthrene	D	1.17E-01	1.88E-11			
Phenol	D	7.98E-03	1.29E-12			
Pyrene	D	2.53E-02	4.07E-12			
Styrene	C	6.11E-06	3.10E-15			
Tetrachloroethene	C-B2	2.03E-03	9.64E-04	4.88E-13	1E-15	3.49E-06
Toluene	D	5.00E-02	2.53E-11			
Trichloroethene	B2	6.00E-03	7.20E-03	3.65E-12	2E-14	7.71E-05
Xylene (ortho)		3.88E-04	1.97E-13			
Xylene (total)	D	5.00E-02	2.53E-11			
Aluminum		1.61E+01	2.59E-09			
Antimony	D	5.83E-01	9.39E-11			
Arsenic	A	1.51E+01	5.80E-03	9.34E-13	1E-11	0.050
Barium	D	3.00E-01	4.83E-11			
Beryllium	B1	8.40E+00	1.80E-03	2.90E-13	2E-12	0.0086
Boron	D	3.31E-01	5.33E-11			
Cadmium	B1	6.30E+00	3.59E-01	5.78E-11	4E-10	1.3
Chromium	A	4.20E+01	4.12E+00	6.63E-10	3E-08	98
Cobalt		1.10E-02	1.77E-12			

**Table D-25. INEEL visitor scenario—potential excess lifetime cancer risk.**

Constituent		S <sub>fi</sub> (mg/kg-day) <sup>-1</sup>	EPC (mg/kg)	Inhalation		%
				WOE	CDI (mg/kg-day)	
Copper	D	2.99E+00	4.81E-10			
Cyanide		3.37E-02	5.43E-12			
Dysprosium		5.93E+00	9.55E-10			
Fluoride		3.87E-01	6.23E-11			
Iron		2.50E+01	4.03E-09			
Manganese	D	4.90E-01	7.89E-11			
Mercury	D	9.45E-01	1.52E-10			
Molybdenum		1.02E+00	1.64E-10			
Nickel	D	3.50E-02	5.64E-12			
Selenium	D	8.46E-02	1.36E-11			
Silver	D	9.84E-01	1.58E-10			
Strontium		1.82E+00	2.93E-10			
Thallium	D	4.30E-04	6.92E-14			
Vanadium		4.50E-02	7.25E-12			
Zinc	D	2.08E+01	3.35E-09			
<b>Estimated Total Risk =</b>				3E-08	100	

Guide to Appendix D Table Abbreviations:

ABSd = Dermal Absorption Factor	SF = slope factor
ABSGi = Gastrointestinal Absorption Factor	SFd = Dermal Slope Factor
CDI = Chronic Daily Intake	Sfi = Inhalation Slope Factor
ELCR = Excess Lifetime Cancer Risk	SFo = Oral Slope Factor
EPC = Exposure Point Concentration	URF = Inhalation Unit Risk Factor
HI = hazard index	WOE = Weight of Evidence
HQ = hazard quotient	Cancer WOE Classifications:
IC = Inhalation Concentration	Group A: Human carcinogen.
NA = not available	Group B: Probably human carcinogen.
Rf <sub>C</sub> = Reference Concentration	B1 - indicates that limited human data are available.
RfD <sub>d</sub> = Dermal Reference Dose	B2 - indicates sufficient evidence in animals and inadequate or no evidence in humans.
RfD <sub>i</sub> = Inhalation Reference Dose	Group C: Possible human carcinogen.
RfD <sub>o</sub> = Oral Reference Dose	Group D: Not classifiable.

Table D-26. INEEL visitor scenario—potential noncarcinogenic risk.

Constituent	RfD <sub>i</sub> (mg/kg-day)	EPC (mg/kg)	Inhalation		Contribution %
			CDI (mg/kg-day)	HQ	
1,1,1-Trichloroethane	2.86E-01	1.57E-03	3.71E-12	1.30E-11	3.45E-05
1,1,2,2-Tetrachloroethane	6.00E-02	4.95E-06	1.17E-14	1.95E-13	5.18E-07
1,1,2-Trichloroethane	4.00E-03	2.42E-05	5.72E-14	1.43E-11	3.80E-05
1,1-Dichloroethane	1.43E-01	2.34E-04	5.53E-13	3.87E-12	1.03E-05
1,1-Dichloroethene	9.00E-03	1.48E-04	3.50E-13	3.89E-11	1.03E-04
1,2,4-Trichlorobenzene	5.70E-02	1.14E-03	2.70E-12	4.73E-11	1.26E-04
1,2-Dichlorobenzene	5.71E-02	1.14E-03	2.70E-12	4.72E-11	1.25E-04
1,2-Dichloroethane	1.40E-03	5.38E-07	1.27E-15	9.08E-13	2.41E-06
1,2-Dichloroethene (total)	1.00E-02	3.24E-05	7.66E-14	7.66E-12	2.04E-05
1,3-Dichlorobenzene	9.00E-04	1.14E-03	2.70E-12	2.99E-09	0.0080
1,4-Dichlorobenzene	2.29E-01	4.50E-02	1.06E-10	4.65E-10	0.0012
1,4-Dioxane					
2,4,5-Trichlorophenol	1.00E-01	4.46E-03	3.35E-12	3.35E-11	8.91E-05
2,4,6-Trichlorophenol					
2,4-Dichlorophenol	3.00E-03	2.16E-03	1.62E-12	5.41E-10	0.0014
2,4-Dimethylphenol	2.00E-02	1.83E-03	1.38E-12	6.88E-11	1.83E-04
2,4-Dinitrophenol	2.00E-03	5.09E-03	3.82E-12	1.91E-09	0.0051
2,4-Dinitrotoluene	2.00E-03	1.14E-03	8.57E-13	4.28E-10	0.0011
2,6-Dinitrotoluene	1.00E-03	2.07E-03	1.56E-12	1.56E-09	0.0041
2-Butanone	2.86E-01	2.47E-03	5.84E-12	2.04E-11	5.43E-05
2-Chloronaphthalene	8.00E-02	1.14E-03	2.70E-12	3.37E-11	8.95E-05
2-Chlorophenol	5.00E-03	1.83E-03	4.33E-12	8.65E-10	0.0023
2-Hexanone	1.40E-03	2.70E-04	2.03E-13	1.45E-10	3.85E-04
2-Methylnaphthalene					
2-Methylphenol	5.00E-02	2.06E-03	1.55E-12	3.10E-11	8.23E-05
2-Nitroaniline	5.71E-05	1.01E-05	2.39E-14	4.18E-10	0.0011
2-Nitrophenol	8.00E-03	1.83E-03	1.38E-12	1.72E-10	4.57E-04
3,3'-Dichlorobenzidine					
3-Nitroaniline	5.71E-05	1.01E-05	2.39E-14	4.18E-10	0.0011
4,6-Dinitro-2-methylphenol	2.00E-03	4.46E-03	3.35E-12	1.68E-09	0.0045
4-Chloroaniline	4.00E-03	4.12E-03	3.10E-12	7.74E-10	0.0021
4-Methyl-2-Pentanone	2.29E-02	2.96E-03	7.00E-12	3.06E-10	8.14E-04
4-Methylphenol	5.00E-03	3.86E-03	2.90E-12	5.80E-10	0.0015
4-Nitroaniline	5.71E-05	1.01E-05	2.39E-14	4.18E-10	0.0011
4-Nitrophenol	8.00E-03	5.16E-03	3.88E-12	4.85E-10	0.0013

Table D-26. INEEL visitor scenario—potential noncarcinogenic risk.

Constituent	RF <sub>i</sub> (mg/kg-day)	EPC (mg/kg)	Inhalation			% Contribution
			CDI (mg/kg-day)	HQ		
Acenaphthene	6.00E-02	2.02E-02	4.78E-11	7.96E-10		0.0021
Acenaphthylene	6.00E-02	2.07E-03	4.89E-12	8.16E-11		2.17E-04
Acetone	1.00E-01	5.00E-02	1.18E-10	1.18E-09		0.0031
Acetonitrile	1.70E-02	1.16E-04	2.74E-13	1.61E-11		4.29E-05
Acrolein	5.71E-06	5.47E-05	1.29E-13	2.26E-08		0.060
Acrylonitrile	5.71E-04	5.83E-05	1.38E-13	2.41E-10		6.41E-04
Anthracene	3.00E-01	3.20E-02	7.56E-11	2.52E-10		6.70E-04
Aramite	5.00E-02	6.71E-04	5.04E-13	1.01E-11		2.68E-05
Aroclor-1016	7.00E-05	7.69E-04	5.78E-13	8.26E-09		0.022
Aroclor-1254	2.00E-05	1.28E-02	9.62E-12	4.81E-07		1.3
Aroclor-1260		5.00E-02	3.76E-11			
Aroclor-1268		6.22E-03	4.67E-12			
Benzene	1.71E-03	5.00E-02	1.18E-10	6.91E-08		0.18
Benzidine	3.00E-03	1.72E-03	1.29E-12	4.31E-10		0.0011
Benzo(a)anthracene		2.53E-02	1.90E-11			
Benzo(a)pyrene		1.05E-02	7.89E-12			
Benzo(b)fluoranthene		1.79E-02	1.35E-11			
Benzo(g,h,i)perylene	3.00E-02	1.14E-03	8.57E-13	2.86E-11		7.59E-05
Benzo(k)fluoranthene		1.86E-03	1.40E-12			
Benzoic acid	4.00E+00	8.56E-04	6.43E-13	1.61E-13		4.27E-07
bis(2-Chloroethyl)ether		1.14E-03	2.70E-12			
bis(2-Chloroisopropyl)ether	4.00E-02	1.14E-03	2.70E-12	6.74E-11		1.79E-04
bis(2-Ethylhexyl)phthalate	2.20E-02	1.47E-02	1.10E-11	5.02E-10		0.0013
Butylbenzylphthalate	2.00E-01	6.79E-03	5.10E-12	2.55E-11		6.78E-05
Carbazole		3.23E-03	2.43E-12			
Carbon Disulfide	2.00E-01	4.55E-03	1.08E-11	5.38E-11		1.43E-04
Chlorobenzene	1.70E-02	6.57E-04	1.55E-12	9.14E-11		2.43E-04
Chloorethane	2.86E+00	1.47E-05	3.48E-14	1.22E-14		3.23E-08
Chlormethane	8.60E-02	3.53E-05	8.35E-14	9.70E-13		2.58E-06
Chrysene		2.65E-02	1.99E-11			
Dibenz(a,h)anthracene		1.14E-03	8.57E-13			
Dibenzofuran	4.00E-03	3.24E-02	7.66E-11	1.91E-08		0.051
Diethylphthalate	8.00E-01	1.14E-03	8.57E-13	1.07E-12		2.85E-06
Dimethylphthalate	1.00E+01	1.14E-03	8.57E-13	8.57E-14		2.28E-07
Di-n-butylphthalate	1.00E-01	2.39E-03	1.80E-12	1.80E-11		4.77E-05

Table D-26. INEEL visitor scenario—potential noncarcinogenic risk.

Constituent	RfD <sub>i</sub> (mg/kg-day)	EPC (mg/kg)	Inhalation			% Contribution
			CDI (mg/kg-day)	HQ		
Di-n-octylphthalate	2.00E-02	2.62E-03	1.97E-12	9.84E-11	2.62E-04	
Ethylbenzene	2.90E-01	7.81E-03	1.85E-11	6.37E-11	1.69E-04	
Famphur		1.00E+01	7.51E-09			
Fluoranthene	4.00E-02	7.62E-02	5.73E-11	1.43E-09	0.0038	
Fluorene	4.00E-02	1.84E-02	1.38E-11	3.46E-10	9.19E-04	
Hexachlorobenzene	8.00E-04	1.14E-03	8.57E-13	1.07E-09	0.0028	
Hexachlorobutadiene	3.00E-04	2.07E-03	1.56E-12	5.19E-09	0.014	
Hexachlorocyclopentadiene	2.00E-05	1.14E-03	8.57E-13	4.28E-08	0.11	
Hexachloroethane	1.00E-03	1.14E-03	8.57E-13	8.57E-10	0.0023	
Indeno(1,2,3-cd)pyrene		1.14E-03	8.57E-13			
Isobutyl alcohol	3.00E-01	1.16E-04	8.72E-14	2.91E-13	7.72E-07	
Isophorone	2.00E-01	1.14E-03	8.57E-13	4.28E-12	1.14E-05	
Kepone		9.92E-03	7.45E-12			
Methyl Acetate	1.00E+00	4.84E-05	1.14E-13	1.14E-13	3.04E-07	
Methylene Chloride	8.57E-01	2.72E-03	6.43E-12	7.50E-12	1.99E-05	
Naphthalene	8.57E-04	4.25E-02	1.00E-10	1.17E-07	0.31	
Nitrobenzene	5.71E-04	1.14E-03	2.70E-12	4.72E-09	0.013	
N-Nitroso-di-n-propylamine		1.14E-03	8.57E-13			
N-Nitrosodiphenylamine		1.14E-03	8.57E-13			
Pentachlorophenol	3.00E-02	5.59E-03	4.20E-12	1.40E-10	3.72E-04	
Phenanthrene	3.00E-01	1.17E-01	8.79E-11	2.93E-10	7.79E-04	
Phenol	6.00E-01	7.98E-03	6.00E-12	9.99E-12	2.66E-05	
Pyrene	3.00E-02	2.53E-02	1.90E-11	6.34E-10	0.0017	
Styrene	2.90E-01	6.11E-06	1.44E-14	4.98E-14	1.32E-07	
Tetrachloroethene	1.14E-01	9.64E-04	2.28E-12	2.00E-11	5.31E-05	
Toluene	1.10E-01	5.00E-02	1.18E-10	1.07E-09	0.0029	
Trichloroethene	6.00E-03	7.20E-03	1.70E-11	2.84E-09	0.0075	
Xylene (ortho)	2.00E-01	3.88E-04	9.17E-13	4.59E-12	1.22E-05	
Xylene (total)	2.00E-01	5.00E-02	1.18E-10	5.91E-10	0.0016	
Aluminum	1.40E-03	1.61E+01	1.21E-08	8.64E-06	23	
Antimony		5.83E-01	4.38E-10			
Arsenic		5.80E-03	4.36E-12			
Barium	1.43E-04	3.00E-01	2.25E-10	1.58E-06	4.2	
Beryllium	5.71E-06	1.80E-03	1.35E-12	2.37E-07	0.63	
Boron	5.71E-03	3.31E-01	4.49E-10	4.35E-08	0.12	

**Table D-26. INEEL visitor scenario—potential noncarcinogenic risk.**

Constituent	RfD <sub>i</sub> (mg/kg-day)	EPC (mg/kg)	Inhalation		% Contribution
			CDI (mg/kg-day)	HQ	
Cadmium	3.59E-01	2.70E-10			
Chromium	4.12E+00	3.10E-09			
Cobalt	1.10E-02	8.27E-12			
Copper	2.99E+00	2.25E-09			
Cyanide	3.37E-02	2.53E-11			
Dysprosium	5.93E+00	4.46E-09			
Fluoride	3.87E-01	2.91E-10			
Iron	2.50E+01	1.88E-08			
Manganese	1.40E-05	4.90E-01	2.68E-10	2.63E-05	70
Mercury	9.45E-01	7.10E-10			
Molybdenum	1.02E+00	7.66E-10			
Nickel	3.50E-02	2.63E-11			
Selenium	8.46E-02	6.36E-11			
Silver	9.84E-01	7.39E-10			
Strontium	1.82E+00	1.37E-09			
Thallium	4.30E-04	3.23E-13			
Vanadium	4.50E-02	3.38E-11			
Zinc	2.08E+01	1.56E-08			
<b>Total HI</b>			<b>3.76E-05</b>	<b>100</b>	

Guide to Appendix D Table Abbreviations:

- ABSD = Dermal Absorption Factor
- ABSGI = Gastrointestinal Absorption Factor
- CDI = Chronic Daily Intake
- ELCR = Excess Lifetime Cancer Risk
- EPC = Exposure Point Concentration
- HI = hazard index
- HQ = hazard quotient
- IC = Inhalation Concentration
- NA = not available
- SF = slope factor
- SFD = Dermal Slope Factor
- SFI = Inhalation Slope Factor
- SFO = Oral Slope Factor
- URF = Inhalation Unit Risk Factor
- WOE = Weight of Evidence
- Cancer WOE Classifications:
  - Group A: Human carcinogen.
  - Group B: Probably human carcinogen.

**Table D-26. INEEL visitor scenario—potential noncarcinogenic risk.**

Constituent	RfD <sub>i</sub> (mg/kg-day)	EPC (mg/kg)	Inhalation		% Contribution			
			CDI (mg/kg-day)	HQ				
<b>Rf<sub>C</sub> = Reference Concentration</b>								
B1 - indicates that limited human data are available.								
<b>RfD<sub>d</sub> = Dermal Reference Dose</b>								
<b>RfD<sub>i</sub> = Inhalation Reference Dose</b>								
<b>RfD<sub>o</sub> = Oral Reference Dose</b>								
B2 - indicates sufficient evidence in animals and inadequate or no evidence in humans.								
Group C: Possible human carcinogen.								
Group D: Not classifiable.								

**Appendix E**

**Emissions of VOCs from Water to Air**

## Appendix E

### Emissions of VOCs from Water to Air

A model presented in the U.S. Environmental Protection Agency (EPA) *Air Emissions Models for Waste and Wastewater* document (EPA 1994) was used to estimate emissions of VOCs released through volatilization into ambient air from water in an uncovered sump. The model used to estimate emissions from the liquid surface is based on an overall mass transfer coefficient that incorporates two resistances to mass transfer in series, the liquid-phase resistance and the gas-phase resistance (EPA 1994).

The liquid surface area (that is, the evaporation pond) was assumed to be a 320-foot by 170-foot area. The emission model equations used are derived from standard equations for quiescent surfaces with flow (EPA 1994, Section 5.2) to determine the emissions. For aqueous systems, the relationship describing mass transfer of a volatile constituent from the open liquid surface to the air is shown in Equation (E-1):

$$E = K \times A \times C_L \quad (\text{E-1})$$

Where:

$E$  = Air emissions from the liquid surface (g/s)

$K$  = Overall mass transfer coefficient (m/s)

$A$  = Liquid surface area ( $\text{m}^2$ )

$C_L$  = Concentration of constituent in the liquid phase ( $\text{g}/\text{m}^3$ ).

The overall mass transfer coefficient ( $K$ ) is estimated from a two-phase resistance model that is based on the liquid-phase mass transfer coefficient ( $k_L$  in m/s), the gas-phase mass transfer coefficient ( $k_G$  in m/s), and Henry's law constant in the form of ( $K_{eq}$ ). The two resistances act in series and the overall resistance is expressed in Equation (E-2) as:

$$\frac{1}{K} = \frac{1}{k_L} + \frac{1}{k_G K_{eq}} \quad (\text{E-2})$$

Where:

$K$  = Overall mass transfer coefficient (m/s)

$k_L$  = Liquid-phase mass transfer coefficient (m/s)

$k_G$  = gas-phase mass transfer coefficient (m/s)

$K_{eq}$  = Equilibrium constant (Henry's Law constant).

The  $k_L$  is derived to provide the liquid-phase mass transfer portion of the entire overall mass transfer coefficient. The  $k_L$  is assumed to be constant for windspeeds below 3.25 m/s (EPA 1994). These

calculations are documented in Table E-1 located at the end of this appendix. The liquid mass transfer coefficient is calculated as follows in Equation (E-3):

$$k_L = \left( \frac{D_w}{D_{ether}} \right)^{2/3} \quad (E-3)$$

Where:

$k_L$  = Liquid-phase mass transfer coefficient (m/s)

$D_w$  = Diffusion coefficient of ether in water ( $\text{cm}^2/\text{s}$ )

$D_{ether}$  = Diffusion coefficient in water ( $\text{cm}^2/\text{s}$ ).

The  $k_G$  is derived to provide the gas-phase mass transfer portion of the entire overall mass transfer coefficient as shown in Equation (E-4):

$$k_G = 4.8 \times 10^3 U^{0.78} SC_G^{-0.67} d_e^{-0.11} \quad (E-4)$$

Where:

$k_G$  = Gas-phase mass transfer coefficient (m/s)

$U$  = Windspeed (m/s)

$SC_G$  = Schmidt number on gas side

$d_e$  = Effective diameter of source (m)

$A$  = Area of the source ( $\text{m}^2$ ).

The effective diameter of the source is calculated as follows in Equation (E-5) (see Table E-2 located at the end of this appendix):

$$d_e = \left( \frac{4A}{\Pi} \right)^{0.5} \quad (E-5)$$

Where:

$d_e$  = Effective diameter of source (m)

$A$  = Area of the source ( $\text{m}^2$ ) (based on a 20-ft  $\times$  5-ft area).

The Schmidt number is calculated as follows in Equation (E-6) (see Table E-2):

$$Sc_G = \frac{u_G}{p_G D_a} \quad (E-6)$$

Where:

$Sc_G$  = Schmidt number on gas side

$u_G$  = Viscosity of air (g/cm-s)

$p_G$  = Density of air (g/cm<sup>3</sup>)

$D_a$  = Diffusion coefficient in air (cm<sup>2</sup>/s).

Table E-2 provides calculated values for mass transfer coefficients for all of the volatile compounds identified in the design inventory, and the specific parameter values for each chemical.

#### Box Model

Concentrations in air from emissions from an area source (such as surface flux emissions) are expected to be highest at the source, and decrease with increasing distance from the source. Therefore, the screening-level approach for evaluating concentrations in ambient air from emissions from water involves calculating concentrations over the source area. EPA has recommended use of a “box” model for calculating concentrations in air over an area source (EPA 1986; 1991). In the box model, the concentration in air within a defined box is proportional to the emission rate and the wind speed across the source area as shown in Equation (E-7):

$$C_a = \frac{Q \times A \times 1,000 \text{ mg/g}}{L \times V \times H} \quad (E-7)$$

Where:

$C_a$  = Concentration in air (mg/m<sup>3</sup>)

$Q$  = Emission rate (g/m<sup>2</sup>-s)

$A$  = Surface area of the source area (m<sup>2</sup>)

$H$  = Mixing height (m)

$V$  = Average windspeed within the mixing zone, assumed to be 0.5 the windspeed at the mixing height (m/s)

$L$  = Width of the surface area perpendicular to the wind direction (m).

A summary of air concentrations calculated using the box model is provided in Table E-3 located at the end of this appendix.

Table E-1. Emissions equation - standing water to ambient air.  
Emissions equation:

$$E = K \times A \times C_L$$

Overall mass transfer coefficient:

$$\frac{1}{K} = \frac{1}{K_L} + \frac{1}{K_G K_{eq}}$$

E	Emissions from liquid surface (g/s)	
K	Overall mass transfer coefficient (m/s)	
C <sub>L</sub>	Concentration in liquid phase (g/m <sup>3</sup> )	

K	overall mass transfer coefficient (m/s)
k <sub>L</sub>	liquid-phase mass transfer coefficient (m/s)
k <sub>G</sub>	gas-phase mass transfer coefficient (m/s)
K <sub>eq</sub>	Equilibrium constant (Henry's Law constant)

Table E-1. Emissions equation - standing water to ambient air.

Chemical	Concentration in Water (mg/L)	Concentration in Water (g/m <sup>3</sup> )	Henry's Law Constant	k <sub>L</sub>	k <sub>G</sub>	I/K	K (m/s)	A (m <sup>2</sup> )	E (g/s)	E (gm <sup>2</sup> s)
1,1,1-Trichloroethane	4.93E-05	4.93E-05	0.7052	1.023	1.91E-03	7.42E-02	1.35E-03	5054	3.36E-04	6.65E-08
1,1,2,2-Tetrachloroethane	3.05E-16	3.05E-16	0.014145	0.952	1.80E-03	3.94E-04	2.54E-05	5054	3.92E-17	7.75E-21
1,1,2-Trichloroethane	2.04E-05	2.04E-05	0.037433	1.023	1.91E-03	1.40E-04	7.16E-05	5054	7.39E-06	1.46E-09
1,1-Dichloroethane	6.84E-11	6.84E-11	0.23042	1.151	1.85E-03	2.35E-03	4.26E-04	5054	1.47E-10	2.92E-14
1,1-Dichloroethene	2.10E-11	2.10E-11	1.0701	1.144	2.11E-03	4.45E-02	2.25E-03	5054	2.39E-10	4.72E-14
1,2,4-Trichlorobenzene	7.39E-08	7.39E-08	0.05822	0.979	1.01E-03	1.70E-04	5.87E-05	5054	2.19E-08	4.34E-12
1,2-Dichlorobenzene	6.46E-116	6.46E-116	0.0779	0.952	1.76E-03	7.29E-03	1.37E-04	5054	4.48E-116	8.87E-120
1,2-Dichloroethane	6.08E-11	6.08E-11	0.040139	1.107	2.32E-03	1.07E+04	9.31E-05	5054	2.86E-11	5.66E-15
1,2-Dichloroethene (total)	4.38E-08	4.38E-08	0.16728	1.209	1.84E-03	3.25E+03	3.08E-04	5054	6.81E-08	1.35E-11
1,3-Dichlorobenzene	7.39E-08	7.39E-08	0.0779	0.952	1.76E-03	7.29E+03	1.37E-04	5054	5.13E-08	1.01E-11
1,4-Dichlorobenzene	2.92E-06	2.92E-06	0.09963	0.952	1.76E-03	5.70E+03	1.76E-04	5054	2.59E-06	5.13E-10
2-Butanone	1.19E-02	1.19E-02	0.0011234	1.100	2.10E-03	4.24E+05	2.36E-06	5054	1.42E-04	2.81E-08
2-Chloronaphthalene	2.13E-12	2.13E-12	0.01271	1.023	1.11E-03	7.08E+04	1.41E-05	5054	1.52E-13	3.01E-17
2-Chlorophenol	1.24E-181	1.24E-181	0.016031	1.074	6.65E-03	9.38E+03	1.07E-04	5054	6.70E-182	1.33E-185
2-Methylnaphthalene	5.08E-02	5.08E-02	0.002378	0.948	1.38E-03	3.04E+05	3.29E-06	5054	8.43E-04	1.67E-07
2-Nitroaniline	1.31E-02	1.31E-02	0.00930701	1.006	1.37E-03	7.85E+04	1.27E-05	5054	8.45E-04	1.67E-07
3-Nitroaniline	1.31E-02	1.31E-02	0.00930701	1.006	1.37E-03	7.85E+04	1.27E-05	5054	1.51E-14	2.98E-18
4-Methyl-2-Pentanone	5.05E-37	5.05E-37	0.00574	0.944	1.86E-03	9.35E+04	1.07E-05	5054	8.45E-04	1.67E-07
4-Nitroaniline	1.31E-02	1.31E-02	0.00930701	1.006	1.37E-03	7.85E+04	1.27E-05	5054	2.73E-38	5.40E-42
Acenaphthene	3.71E-13	3.71E-13	0.006355	0.935	1.27E-03	1.24E+05	8.04E-06	5054	8.45E-04	1.67E-07
Acenaphthylene	5.22E-10	5.22E-10	0.004674	0.922	1.30E-03	1.64E+05	6.08E-06	5054	1.60E-11	3.17E-15
Acetone	4.46E-113	4.46E-113	0.0015908	1.216	2.61E-03	2.41E+05	4.15E-06	5054	9.37E-115	1.85E-118
Acetonitrile	7.71E-33	7.71E-33	0.00082	1.587	2.67E-03	4.57E+05	2.19E-06	5054	8.52E-35	1.68E-38
Acrolein	1.68E-37	1.68E-37	0.00492	1.272	2.33E-03	8.71E+04	1.15E-05	5054	9.78E-39	1.94E-42
Acrylonitrile	3.63E-26	3.63E-26	0.0036244	1.355	2.38E-03	1.16E+05	8.64E-06	5054	1.59E-27	3.14E-31

Table E-1. Emissions equation - standing water to ambient air.

Chemical	Concentration in Water (mg/L)	Concentration in Water (g/m <sup>3</sup> )	Henry's Law Constant	k <sub>L</sub>	k <sub>G</sub>	I/K	K (m/s)	A (m <sup>2</sup> )	E (g/s)	E (gm^2·s)
Anthracene	3.85E-10	3.85E-10	0.002665	0.939	1.06E-03	3.53E+05	2.83E-06	5054	5.51E-12	1.09E-15
Benzene	7.43E-07	7.43E-07	0.22755	1.100	2.07E-03	2.12E+03	4.72E-04	5054	1.77E-06	3.50E-10
bis(2-Chloroethyl)ether	7.39E-08	7.39E-08	0.000738	0.922	1.77E-03	7.68E+05	1.30E-06	5054	4.87E-10	9.63E-14
bis(2-Chloroisopropyl)ether	1.90E-09	1.90E-09	0.004633	0.828	1.66E-03	1.30E+05	7.69E-06	5054	7.36E-11	1.46E-14
Carbon Disulfide	1.99E-298	1.99E-298	1.2423	1.114	2.32E-03	3.48E+02	2.87E-03	5054	2.89E-297	5.71E-301
Chlorobenzene	1.28E-09	1.28E-09	0.1517	1.016	1.83E-03	3.60E+03	2.78E-04	5054	1.79E-09	3.54E-13
Chloretthane	1.81E-52	1.81E-52	0.451	1.223	2.32E-03	9.56E+02	1.05E-03	5054	9.57E-52	1.89E-55
Chloromethane	3.50E-05	3.50E-05	0.984	0.836	2.39E-03	4.26E+02	2.35E-03	5054	4.15E-04	8.21E-08
Dibenzofuran	7.96E-35	7.96E-35	0.000533	1.114	1.61E-03	1.17E+06	8.56E-07	5054	3.45E-37	6.82E-41
Ethylbenzene	6.86E-11	6.86E-11	0.32308	0.944	1.86E-03	1.66E+03	6.02E-04	5054	2.09E-10	4.13E-14
Methyl Acetate	2.34E-04	2.34E-04	0.0008446	1.114	2.31E-03	5.13E+05	1.95E-06	5054	2.30E-06	4.55E-10
Methylene Chloride	4.96E-44	4.96E-44	0.08979	1.237	2.27E-03	4.90E+03	2.04E-04	5054	5.12E-44	1.01E-47
Naphthalene	9.79E-17	9.79E-17	0.019803	0.920	1.59E-03	3.18E+04	3.14E-05	5054	1.55E-17	3.08E-21
Nitrobenzene	5.17E-08	5.17E-08	0.0009799	1.008	1.88E-03	5.43E+05	1.84E-06	5054	4.81E-10	9.52E-14
Styrene	6.37E-14	6.37E-14	0.11275	0.960	1.80E-03	4.94E+03	2.02E-04	5054	6.52E-14	1.29E-17
Tetrachloroethene	2.74E-07	2.74E-07	0.7544	0.976	1.81E-03	7.32E+02	1.37E-03	5054	1.89E-06	3.74E-10
Toluene	8.98E-33	8.98E-33	0.27224	1.008	2.06E-03	1.79E+03	5.60E-04	5054	2.54E-32	5.03E-36
Trichloroethene	1.57E-06	1.57E-06	0.4223	1.047	1.93E-03	1.23E+03	8.14E-04	5054	6.45E-06	1.28E-09
Xylene (ortho)	2.04E-23	2.04E-23	0.30094	0.944	1.78E-03	1.87E+03	5.35E-04	5054	5.51E-23	1.09E-26
Xylene (total)	1.81E-20	1.81E-20	0.30094	0.944	1.78E-03	1.87E+03	5.35E-04	5054	4.90E-20	9.70E-24

Table E-2. Mass transfer coefficient calculations.

Liquid-phase mass transfer coefficient		Gas-phase mass transfer coefficient		Schmidt Number Calculation	
$K_L = \left( \frac{D_w}{D_{ether}} \right)^{2/3}$		$K_G = 4.82 \times 10^{-3} U^{0.78} SC_G^{-0.67} d_e^{-0.11}$			
D <sub>ether</sub>	Diffusion coefficient of ether in water (cm <sup>2</sup> /s)	U	Windspeed (m/s)	u <sub>G</sub>	viscosity of air (g/cm <sup>2</sup> s)
D <sub>w</sub>	Diffusion coefficient in water (cm <sup>2</sup> /s)	SC <sub>G</sub>	Schmidt number on gas side	p <sub>G</sub>	density of air (g/cm <sup>3</sup> )
	chemical specific		chem specific		
		d <sub>e</sub>	Effective diameter of source (m)	D <sub>a</sub>	Diffusion coefficient in air (cm <sup>2</sup> /s)
		A	Area of the source (m <sup>2</sup> )		chem specific
		$d_e = \left( \frac{4 A}{\Pi} \right)^{0.5}$			
Chemical	Diffusion coefficient in air (cm <sup>2</sup> /s)	Diffusion coefficient in water (cm <sup>2</sup> /s)	k <sub>t</sub> (m/s)	SC <sub>e</sub>	k <sub>i</sub> (m/s)
1,1,1-Trichloroethane	0.078	0.0000088	1.023	1.93	0.001912878
1,1,2,2-Tetrachloroethane	0.071	0.0000079	0.952	2.12	0.001796085
1,1,2-Trichloroethane	0.078	0.0000088	1.023	1.93	0.001912878
1,1-Dichloroethane	0.0742	0.0000105	1.151	2.03	0.001849927
1,1-Dichloroethylene	0.09	0.0000104	1.144	1.68	0.00210536
1,2,4-Trichlorobenzene	0.03	0.00000823	0.979	5.03	0.001008452
1,2-Dichlorobenzene	0.069	0.0000079	0.952	2.19	0.001762028
1,2-Dichloroethane	0.104	0.0000099	1.107	1.45	0.00231951
1,2-Dichloroethylene (total)	0.0736	0.0000113	1.209	2.05	0.001839891
1,3-Dichlorobenzene	0.069	0.0000079	0.952	2.19	0.001762028
1,4-Dichlorobenzene	0.069	0.0000079	0.952	2.19	0.001762028
2-Butanone	0.08951	0.0000098	1.100	1.69	0.002097673
2-Chlorophthalene	0.0347	0.0000088	1.023	4.35	0.001111744
2-Chlorophenol	0.501	0.00000946	1.074	0.30	0.00665082

Table E-2. Mass transfer coefficient calculations.

Chemical	Diffusion coefficient in air (cm <sup>2</sup> /s)	Diffusion coefficient in water (cm <sup>2</sup> /s)	k <sub>t</sub> (m/s)	SC <sub>e</sub>	k <sub>i</sub> (m/s)
1,1,1-Trichloroethane	0.078	0.0000088	1.023	1.93	0.001912878
1,1,2,2-Tetrachloroethane	0.071	0.0000079	0.952	2.12	0.001796085
1,1,2-Trichloroethane	0.078	0.0000088	1.023	1.93	0.001912878
1,1-Dichloroethane	0.0742	0.0000105	1.151	2.03	0.001849927
1,1-Dichloroethylene	0.09	0.0000104	1.144	1.68	0.00210536
1,2,4-Trichlorobenzene	0.03	0.00000823	0.979	5.03	0.001008452
1,2-Dichlorobenzene	0.069	0.0000079	0.952	2.19	0.001762028
1,2-Dichloroethane	0.104	0.0000099	1.107	1.45	0.00231951
1,2-Dichloroethylene (total)	0.0736	0.0000113	1.209	2.05	0.001839891
1,3-Dichlorobenzene	0.069	0.0000079	0.952	2.19	0.001762028
1,4-Dichlorobenzene	0.069	0.0000079	0.952	2.19	0.001762028
2-Butanone	0.08951	0.0000098	1.100	1.69	0.002097673
2-Chlorophthalene	0.0347	0.0000088	1.023	4.35	0.001111744
2-Chlorophenol	0.501	0.00000946	1.074	0.30	0.00665082

**Table E-2.** Mass transfer coefficient calculations.

Chemical	Diffusion coefficient in air (cm <sup>2</sup> /s)	Diffusion coefficient in water (cm <sup>2</sup> /s)	Diffusion coefficient in water (m/s)	k <sub>L</sub> (m/s)	Sc <sub>g</sub>	k <sub>G</sub> (m/s)
2-Methylnaphthalene	0.048	0.000000784	0.948	3.14	0.001381706	
2-Nitroaniline	0.0473	0.000000838	1.006	3.19	0.001368172	
3-Nitroaniline	0.0473	0.000000838	1.006	3.19	0.001368172	
4-Methyl-2-Pentanone	0.075	0.00000078	0.944	2.01	0.001863266	
4-Nitroaniline	0.0473	0.000000838	1.006	3.19	0.001368172	
Acenaphthene	0.0421	0.000000769	0.935	3.58	0.001265473	
Acenaphthylene	0.0439	0.000000753	0.922	3.44	0.001301473	
Acetone	0.124	0.0000114	1.216	1.22	0.002609615	
Acetonitrile	0.128	0.0000117	1.587	1.18	0.00266572	
Acrolin	0.105	0.0000122	1.272	1.44	0.002334429	
Acrylonitrile	0.1084	0.0000134	1.355	1.39	0.002384808	
Anthracene	0.0324	0.00000774	0.939	4.66	0.001061815	
Benzene	0.088	0.0000098	1.100	1.71	0.002073897	
bis(2-Chloroethyl)ether	0.0692	0.00000753	0.922	2.18	0.001765448	
bis(2-Chloroisopropyl)ether	0.06308	0.0000064	0.828	2.39	0.001659248	
Carbon Disulfide	0.104	0.00001	1.114	1.45	0.002311951	
Chlorobenzene	0.073	0.0000087	1.016	2.07	0.001829828	
Chloethane	0.1041	0.0000115	1.223	1.45	0.002321004	
Chlormethane	0.1088935	0.0000065	0.836	1.39	0.002392077	
Dibenzofuran	0.0601	0.00001	1.114	2.51	0.001606312	
Ethylbenzene	0.075	0.0000078	0.944	2.01	0.001863266	
Methyl Acetate	0.10315	0.000001	1.114	1.46	0.002306791	
Methylene Chloride	0.101	0.0000117	1.237	1.49	0.002274465	
Naphthalene	0.059	0.0000075	0.920	2.56	0.001586554	
Nitrobenzene	0.076	0.0000086	1.008	1.98	0.001879875	
Styrene	0.071	0.000008	0.960	2.12	0.001796085	
Tetrachloroethene	0.072	0.0000082	0.976	2.09	0.001812995	
Toluene	0.087	0.000086	1.008	1.73	0.002058078	
Trichloroethene	0.079	0.0000091	1.047	1.91	0.001929275	
Xylene (ortho)	0.07	0.0000078	0.944	2.15	0.001779097	
Xylene (total)	0.07	0.0000078	0.944	2.15	0.001779097	

Table E-3. "Box" model - ambient air concentrations.

$$C = \frac{Q * 1000}{L \times V \times H}$$

Parameter	Symbol	Value
Concentration (mg/m3)	C	
Emission rate (g/s)	Q	See Table A-1
"Box" Length perpendicular to wind direction (m)	L	51.82
Wind speed (m/s)	V	2
"Box" Height (m)	H	2

Chemical	Q (g/s)	C (mg/m3)
1,1,1-Trichloroethane	3.36E-04	1.62E-03
1,1,2,2-Tetrachloroethane	3.92E-17	1.89E-16
1,1,2-Trichloroethane	7.39E-06	3.57E-05
1,1-Dichloroethane	1.47E-10	7.11E-10
1,1-Dichloroethene	2.39E-10	1.15E-09
1,2,4-Trichlorobenzene	2.19E-08	1.06E-07
1,2-Dichlorobenzene	4.48E-116	2.16E-115
1,2-Dichloroethane	2.86E-11	1.38E-10
1,2-Dichloroethene (total)	6.81E-08	3.28E-07
1,3-Dichlorobenzene	5.13E-08	2.47E-07
1,4-Dichlorobenzene	2.59E-06	1.25E-05
2-Butanone	1.42E-04	6.86E-04
2-Chloronaphthalene	1.52E-13	7.35E-13
2-Chlorophenol	6.70E-182	3.23E-181
2-Methylnaphthalene	8.43E-04	4.07E-03
2-Nitroaniline	8.45E-04	4.08E-03
3-Nitroaniline	8.45E-04	4.08E-03
4-Methyl-2-Pentanone	2.73E-38	1.32E-37
4-Nitroaniline	8.45E-04	4.08E-03
Acenaphthene	1.51E-14	7.28E-14
Acenaphthylene	1.60E-11	7.74E-11
Acetone	9.37E-115	4.52E-114
Acetonitrile	8.52E-35	4.11E-34
Acrolein	9.78E-39	4.72E-38
Acrylonitrile	1.59E-27	7.65E-27
Anthracene	5.51E-12	2.66E-11
Benzene	1.77E-06	8.54E-06
bis(2-Chloroethyl)ether	4.87E-10	2.35E-09
bis(2-Chloroisopropyl)ether	7.36E-11	3.55E-10
Carbon Disulfide	2.89E-297	1.39E-296
Chlorobenzene	1.79E-09	8.63E-09
Chloroethane	9.57E-52	4.62E-51
Chloromethane	4.15E-04	2.00E-03
Dibenzofuran	3.45E-37	1.66E-36
Ethylbenzene	2.09E-10	1.01E-09
Methyl Acetate	2.30E-06	1.11E-05
Methylene Chloride	5.12E-44	2.47E-43
Naphthalene	1.55E-17	7.50E-17
Nitrobenzene	4.81E-10	2.32E-09
Styrene	6.52E-14	3.15E-13
Tetrachloroethene	1.89E-06	9.12E-06
Toluene	2.54E-32	1.23E-31
Trichloroethene	6.45E-06	3.11E-05
Xylene (ortho)	5.51E-23	2.66E-22
Xylene (total)	4.90E-20	2.36E-19